Washington State Department of Transportation

Memorandum

Date: January 18, 2006

TO: Thanh Nguyen/Gary Larson
Headquarters Facilities Office, MS 47328

FROM: Tony Allen/Todd Mooney
E&EP Geotechnical Branch, MS 47365

SUBJECT: BE-0034
Olympic Region Headquarters Replacement
Geotechnical Baseline Report

Attached with this memorandum is the *Geotechnical Baseline Report* (GBR) for the subject project. The project is to be a design build project, and the GBR should be included as part of the request for proposals. The GBR includes the following general elements:

- Project and site descriptions
- Summary of field investigation and testing
- Description of subsurface soil conditions and site seismicity
- Description of ground and surface water conditions
- Discussion of feasible foundation and retaining wall types as well as other geotechnical features of the project
- Construction considerations

If you have questions or require further information, please contact Tony Allen at (360) 709-5450 or Todd Mooney at (360) 709-5463.

TMA:dtm

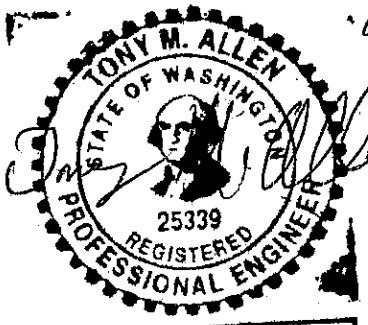
Enclosure

cc: Mel Hitzke, Region Materials Engineer, Olympic Region, MS 47440

GEOTECHNICAL BASELINE REPORT

Olympic Region Headquarters Replacement

BE-0034



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EXPIRES 07-01-07

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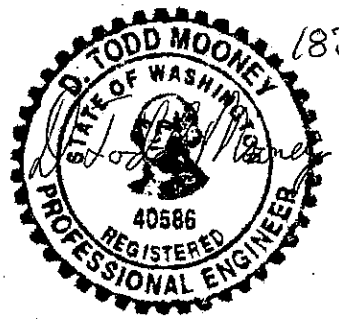

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January 18, 2006

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1 INTRODUCTION

1.1 GENERAL

The construction of the new Olympic Region Headquarters facility is to be a design build project. This geotechnical baseline report (GBR) should be included with the request for proposal (RFP) for examination by prospective bidders. The GBR presents the results of our geotechnical investigation for the replacement of the Olympic Region Headquarters Building. The baseline report contains all factual information such as boring logs and laboratory test results that were collected during our investigation of the site. The report also provides conceptual geotechnical recommendations for development of seismic design parameters, building and retaining wall foundations, storm water treatment facilities, cuts, embankments, shoring and the reuse of on-site material for fills. A vicinity map of the project location is presented in Figure 1.

For the purposes of formulating bids, the information contained in sections 5.4 and 5.5 should be considered non-obligatory. That is, the nature of this information is considered to be background and/or preliminary in nature and should not directly affect development of estimates for bids. The remaining sections and appendices of the GBR are obligatory. That is, this is the factual information regarding the project, the results of the site exploration and our interpretation of how those findings will affect construction.

The analyses, conclusions, and recommendations in this GBR are based upon seven (7) borings and five (5) test pits that were completed specifically for the project, published geologic information for the vicinity and our experience with foundation design in similar geologic conditions. Due to the spacing between the exploration sites, they are assumed to be representative of only their immediate vicinity. Once final structure and pond locations are determined, additional, site specific borings should be considered for selection of final geotechnical design parameters. Additional limitations of this report are discussed under *Intended Report Use and Limitations*.

1.2 PROJECT DESCRIPTION

The proposed project is a new headquarters complex for the Olympic Region. The headquarters complex is to consist of two structures, and associated parking and storm water facilities. The project is to be design-build, thus the GBR will become part of the bid documents. The new headquarters complex will be built on an approximately 37 acre site. The site development plan provided to our office is shown in Figure 2. The northeast portion of the site consists of a wooded 17.7 acre parcel, where the new structures will likely be located. The southwestern portion of the site consists of an open, 20 acre parcel. This parcel has been used for livestock grazing, and its southwestern portion continues to be used for such. We understand that the intended uses for the 20 acre parcel are overflow parking and possibly storm water ponds.

The two buildings being proposed are an Administration Building and a Consolidated Shop. The Administration Building will have a gross floor area of about 99,000 square feet. The Consolidated Shop structure will have a gross floor area of about 60,000 square feet. The shop structure will include a bridge crane and hydraulic lifts. Therefore high foundation loads are

anticipated. The exact footprint and number of stories, for each structure, will be determined by the design-build team. Additional proposed building and parking details are included on Figure 2.

Various means of storm water control have been discussed. These include ponds and detention vaults. The water in the detention vaults would also be used for fire suppression. At this stage of planning, locations for neither the storm water facilities nor the structures have been positively identified.

2 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 SUBSURFACE EXPLORATION

It is recognized that at the time of the production of the GBR and RFP that the final locations of structures and other project features are undetermined. The subsurface exploration conducted for the production of this GBR was intended to provide an overview of the general subsurface conditions at the site and not for final determination of geotechnical design parameters. Hence to minimize contingency costs in the bids and to limit risk, additional subsurface exploration to supplement that in the GBR may be desirable during the RFP process. The State Geotechnical Engineer and the HQ Facilities Office should decide prior to advertisement of the RFP whether additional subsurface exploration is to be performed during the RFP process. If it is determined that additional exploration will be done, the short-listed bidders must submit their requests for additional information. These are then evaluated by WSDOT who will then develop a final plan for the supplemental investigation. Further information, including an example of a supplementary boring program, is provided in the WSDOT *Geotechnical Design Manual* (GDM), Chapter 22.

The subsurface exploration conducted for the GBR consisted of 7 borings, H-1-05, H-2-05, H-3-05, H-4-05, H-5-05, H-6-05 and H-7-05, and 5 test pits, TP-1-05, TP-2-05, TP-3-05, TP-4-05 and TP-5-05 that were completed in late October and early November of 2005. The borings were advanced to depths of 30 to 45 feet. Piezometers were installed in all of the borings. The borings were drilled with a CME850 (a track mounted drill) using wet rotary methods. Standard penetration testing (SPT) was done at approximately 2.5 ft intervals in the upper 10-15 ft of the borings and then at 5 ft intervals to the bottom of the borings. Standard penetration testing consists of driving an 18 in long by 2 in diameter split barrel sampler into the soil at the bottom of the borehole. The number of blows required to drive the sampler the final 12 inches constitutes the standard penetration blow count or N-value for the soil at that location. Boring logs for all 7 borings are contained in Appendix A.

The test pits were excavated using a Case CX130 Excavator, with a 41 in wide bucket. The test pits were excavated to depths ranging from 9 to 12 feet. In plan, the test pits were generally about 21 ft long and about 5 ft wide at the surface. The test pits were difficult to excavate, usually taking about 1 hour to complete. The test pits were logged by personnel from the Geotechnical Division. Completed test pit logs are contained in Appendix B. Also included with the test pit logs are photos of the test pits. The test pits locations are shown in Figures 3 and 4. Test pits TP-2-05 and TP-4-05 were located near borings for the purpose of comparing the variability of the stratigraphy observed in the test pit, with that interpreted from the borings.

The boring and test pit locations and elevations recorded on the respective logs were determined using global positioning system techniques. The boring and test pit locations are given in Washington State Plane (South Zone) coordinates. The horizontal accuracy is sub-meter, and the vertical accuracy is 2-3 meters. The vertical error is evident when comparing the elevations between the test pits located immediately adjacent to borings H-2-05 and H-4-05; there is a difference in elevation of up to 10 feet. For these cases, the test pit was located vertically, in Figure 5, to be coincident with the boring. In other cases, the elevation determined using GPS does not agree with the elevation shown on Figure 4, e.g., H-5-05.

2.2 LABORATORY TESTING

Laboratory testing was performed on selected samples from the field exploration program. Only disturbed samples were recovered during our site investigation. Disturbed samples are those obtained during SPT. The disturbed samples were used for classification and index property testing.

For each boring, all of the soil samples were visually examined and then grouped together based on particle size distribution, consistency, and color. Once groups of samples were established that had similar characteristics, a minimum of one sample per group was tested. However, we tested most of the samples in the upper 15 ft of the borings for the purposes of determining their potential infiltration characteristics. The testing consisted of performing particle size analyses and, if applicable, determining the Atterberg Limits. The tests were done in accordance with AASHTO T-88, T-89, and T-90 guide specifications, respectively. After the testing was complete, the samples were classified using the Unified Soil Classification System (USCS). All laboratory test results are presented in Appendix C.

To better characterize the upper site soils, bag samples were collected from each test pit. The bag samples were identified as B-1, etc. Two bag samples were collected from each test pit, except for TP-2-05, where only one was obtained. For each bag sample collected, a smaller sample was collected and enclosed in a ziplock bag. This sample was used to determine the insitu moisture content. These smaller bag samples were designated B-1-A, B-2-A, etc. The moisture contents determined are reported with the grain size results in Appendix C.

Grain size analyses for the bag samples were done per AASHTO T-27 and T-11 guide specifications. Grain size testing of the bag samples was done by the Physical Testing Section of the Headquarters Materials Laboratory. Copies of the test results provided by the Physical Testing Section are contained in Appendix C, and the results are also summarized on the Laboratory Summary sheets for the respective test pit, also in Appendix C.

3 GEOLOGIC SETTING

3.1 REGIONAL GEOLOGY

The project site is located in the southern portion of the Puget Lowland physiographic province of Washington State. The Puget Lowland is a north-south trending depression bounded on the east and west by the Cascade Mountain Range and Olympic Mountains, respectively.

The topography and geology of the Puget Lowland are a result of several cycles of regional glaciation during the Pleistocene Epoch. The last glacial advance and retreat known as

the Vashon Stade of the Fraser Glaciation ended approximately 10,000 to 13,000 years ago. At the height of the glacial advance, the Vashon ice, termed the Puget Lobe, is believed to have filled the lowland to a thickness of up to 5600 ft in the deepest part of the trough.

Topography of the lowland is characterized by generally north-south trending ridges and valleys that are the result of glacial scouring. These ridges and valleys have been modified by post glacial erosion and deposition. Elevations in the lowland range from below sea level to as much as 1000 feet. The deepest valleys are glacially sculpted troughs extending 160 to 300 ft below sea level and are inundated by marine waters of the Puget Sound.

3.2 SITE GEOLOGY

The site is located at the southern end of peninsula extending into the extreme southern portion of Puget Sound. The peninsula is bounded on the west by Henderson Inlet and on the east by Nisqually Reach. Elevations at the site are about 200 to 240 feet. The site is located in the Peninsular Area of Thurston County, as defined by Pringle (1990). The area is described as being mantled by primarily Vashon age till. The soils in the area are mapped as Alderwood gravelly sandy loam with 3 to 15 percent slopes. Pringle reports that the Alderwood soils in this area have a 6 in surface layer of very dark brown gravelly sandy loam. The subsoil consists of a 9 inch thickness of dark brown gravelly sandy loam, and the lower 15 inches is dark brown very gravelly sandy loam. A hardpan layer is reported as occurring at a depth of between 20 and 40 inches.

Mapped units at the site are Vashon recessional outwash (Qgo) and Vashon till (Qgt) (Logan, et al., 2003). A detail of the map from Logan, et al. is shown in Figure 4, with the boundaries of the site shown in red. The boring and test pit locations are also shown on this figure. The majority of the site is within the Vashon till area. Recessional outwash is mapped as occurring in the northern portion of the site, north of 32nd Ave. NE and in the extreme western end of the site. The mapped boundaries are reportedly accurate to within 200 ft (Logan, et al.); therefore, these boundaries should not be considered definite.

The Vashon recessional outwash is generally described as stratified, moderately to well rounded sand and gravels, that are poorly to moderately well sorted, i.e., in the parlance of geotechnical engineering they are well graded. There are local occurrences of silt and clay, including lacustrine deposits and ice contact stratified drift. Logan et al. note that portions of the mapped recessional outwash may actually be advance outwash. The multilithologic nature of the gravel particles, e.g., granitic, quartzitic, that were observed in the test pits, is consistent with the northern and mixed northern sources for the sediments.

The Vashon till is generally described as an unstratified, highly compacted mixture of clay, silt, sand and gravel. It is gray where it is fresh and light yellowish brown where stained. This difference in coloration was evident at the site, particularly in the test pit exposures (see photos in Appendix B). The brown portions exposed in the test pits are assumed to be the developed horizons of the Alderwood soils.

In the test pits, fresh till, gray in color, was usually observed to occur within 4 ft of the surface. The till is reported as being generally matrix supported, which was the case at the site. The till may contain cobbles and boulders, both of which were observed in the test pits. Outwash clay, silt, sand and gravel occur within the mapped till. Recent, weakly developed soil may form

on loose gravel, but the underlying till remains unweathered. Logan et al. state that the till thickness ranges from less than 1 in. to over 30 ft, with thicknesses of 2-10 ft being most common.

3.3 SITE SEISMICITY

The tectonic structure and stresses in Western Washington are mostly associated with the subduction of the Juan de Fuca Plate under the North American Plate. Under the framework of the subduction zone, the region can be divided into three tectonic provinces: (1) the Juan de Fuca Plate, (2) the continental forearc on the western edge of the North American Plate, and (3) the landward continental volcanic arc. Regional faulting and structural trends, especially in the Puget Lowland, are greatly complicated by the glacial and non-glacial soil deposits masking the bedrock.

Within this tectonic environment four potential seismic sources can be identified: interplate and intraplate seismic activity associated directly with the subduction of the Juan de Fuca under the North American Plate, seismic activity associated with the volcanic arc, and shallow crustal earthquakes. Interface, or subduction zone, earthquakes take place at the boundary of the Juan de Fuca and the North American Plates. Although a subduction zone earthquake has not been recorded off the coast of Washington or Oregon during historic time, geologic evidence suggest that they may occur. The last great earthquake to occur on the interface zone appears to have occurred around the year 1700. Studies of recurrence suggest that the average recurrence interval is about 450 years with a 90 percent confidence interval of about 200 years. A magnitude M8 to M9 earthquake is believed possible along the subduction zone, however, the best estimate is M8.3 (USCOE, 1994 and Geomatrix, 1995).

Intraslab earthquakes take place within the subducting Juan de Fuca Plate at depths between 25 to 40 miles. These earthquakes occur inland from the interface earthquakes. Intraslab earthquakes have occurred in the Puget Sound region, with five historical earthquakes having magnitudes greater than 6. The largest earthquakes include the 1949 magnitude 7.1 Olympia Earthquake, the 1965 magnitude 6.5 Seattle-Tacoma Earthquake and the 2001 magnitude 6.8 Nisqually Earthquake. The recurrence interval for intraslab earthquakes is highly uncertain, however, Geomatrix (1995) suggests a 1,000-year and 5,000-year recurrences for M7 and M7.5, respectively.

The third major type of earthquake is the crustal earthquake, which occurs in the North American Plate, typically at depths between 6 and 12 miles. Several earthquakes, between M4.0 and M5+, have occurred in the Cascade Range over the past 150 years. The maximum expected magnitudes for crustal earthquakes varies throughout the state and depends on the thickness of the crust and the length and rate at which seismic strain accumulates on faults.

4 SUBSURFACE CONDITIONS

4.1 SITE SUBSURFACE CONDITIONS

Most of the borings and test pits are shown in Figure 5. The cross-section locations are shown in Figure 3. The ground line shown was drawn by connecting the surface elevations of the borings (as determined by GPS techniques, discussed above) and does not represent the actual ground line between borings. The stick figure for each boring shows the uncorrected N-

value, the soil classification (USCS) and the percent gravel and fines. Additional details are contained on the individual boring and test pit logs as well as the laboratory test results. Stratigraphy between the borings has not been interpolated, due to the distances between the borings.

The soil deposits encountered in the borings and test pits at the site of the proposed Olympic Region Headquarters building have been grouped into two soil units for geotechnical distinction. The soil units are grouped primarily on the basis of engineering properties and classification and, in general, reflect depositional environments as well. However, it was difficult to make a clear distinction between the units. Both units consist primarily of silty sand with gravel, cobbles and boulders. The distinction between the units is based on a slight difference in their fines contents and the descriptions given in Logan, et al. (2003).

A study of the grain size characteristics of the recovered samples indicated few trends with depth. However, there was a very weak trend for decreasing fines content with depth. The available data suggested that the fines content decreased somewhat below about 15 feet. The following table summarizes the findings for the fines contents in each boring and test pit.

Table 1: Summary of Fines Content Data

Boring or Test Pit Number	Average Fines Content	
	0 – 15 ft	> 15 ft
H-1-05	32	13
H-2-05	27	21
H-3-05	28	16
H-4-05	26	11
H-5-05	29	22
H-6-05	26	21
H-7-05	29	12
TP-1-05	18	ND[1]
TP-2-05	23	ND
TP-3-05	14	ND
TP-4-05	23	ND
TP-5-05	11	ND

Notes: 1. ND = no data

Similar analyses of the gravel and sand contents revealed no clear trends. Therefore, based primarily upon its higher fines content, unit 1 is interpreted as the Vashon till. Further evidence for this conclusion is that the change in the fines content occurred at about 15 ft, which correlates reasonably well with the typical till thicknesses given in Logan, et al. The geologic interpretation of Unit 2 is less clear. It may be lower fines content portion of the till or it may be advance outwash. Logan, et al. reported that some of the mapped areas of recessional outwash could be advance outwash. Unit 1 was encountered in every boring except for H-7-05. Unit 2 was encountered in every boring. The test pits appeared to be wholly within unit 1. The units are individually described below, and abbreviated descriptions appear on Figure 5.

Unit 1 – Silty Sand with Gravel, Cobbles and Boulders (Average Fines Content = 24%): Unit 1 is interpreted as being the Vashon till described by

Logan, et al. (2003). At the site, the unit consists primarily of very dense silty sand, with gravel, cobbles and boulders. The deposit is matrix supported. The top 3 to 4 ft of the unit is brown in color; it then changes color to gray. The observations of the matrix supported material and the coloration are both consistent with the description for the Vashon till given in Logan, et al. The adjacent photos from test pits TP-1-05 and TP-5-05 illustrate the matrix supported nature of the deposit and the color change.

Generally, the thickness of the unit varied from 15 to 20 feet. However, in H-5-05 the till was interpreted as extending to a depth of about 29 ft, which is the upper end of the range given for the till thickness by Logan et al. (2003). The fines content ranges from about 5 to 42%, with an overall average of 24 percent. Considering only the samples from the test pits, the fines content ranged from 9 to 24%, with an average of 18 percent.

The presence of cobbles and boulders was confirmed from the test pits (see logs and photos in Appendix B) and from the borings. As observed in the excavated material from the test pits, cobbles in the unit were generally 4 inches or less. Occasional boulders were encountered in the test pits. For example, in TP-1-05 a boulder measuring 1 ft in diameter was recovered from a depth of about 8 feet. The drillers noted that the behavior of the drill indicated the presence of cobble and/or boulder sized material for the full depth of borings H-2-05 and H-5-05 and between 20 and 24 ft in boring H-4-05.

In boring H-1-05 there was a very dense non-plastic silt lens at a depth of about 9 feet. From immediately below the silt to a depth of about 20 ft the unit became dense silty sand, with the gravel content as low as 3 percent. This silt/silty sand sequence may represent an advance outwash deposit.

Unit 2 – Silty Sand with Gravel, Cobbles and Boulders and Gravel (Average Fines Content = 17%): Similar to unit 1, unit 2 consists largely of silty sand with cobbles and boulders. The best example of the silty sand portion of the unit is in boring H-3-05, where the gravel content is only 3-18% and the fines content is 12-18 percent. Unit 2 in borings H-5-05 and H-6-05 is also primarily silty sand. In borings H-1-05, H-2-05, H-4-05 and H-7-05 unit 2 contains silty gravels (GM) and dual classification sands and gravels (SW-SM, GW-GM).

4.2 GROUND WATER

Open standpipe piezometers were installed in all of the borings. The water level readings from the piezometers indicate that the water table is generally between 15 and 30 ft below the surface. No artesian pressures were observed in the borings. Additional discussion regarding the piezometer placements are given below; full details are shown on the boring logs.

Water level readings observed since the installation of the piezometers are recorded at the bottom of the individual boring logs in Appendix A. The most recent water level reading (Dec. 2005) is shown on the profile portion of the log. Following completion of this baseline report, responsibility for observation of water levels in the piezometers was to be assumed by the Headquarters Facilities Office. In order to provide the most usefulness, piezometers should be read at least monthly for one year prior to the advertisement of the project.

In general, the screens for the piezometers and/or the sanded portion of the piezometer overlapped the upper, higher fines content material and the underlying lower fines content material. The screen in H-6-05 was however, sealed wholly within the lower material. This piezometer was dry for all readings. Therefore, as stated above, there is no indication of artesian pressures within the cleaner material.

The shallowest depth to ground water is at boring H-4-05. In October 2005 the ground water surface was recorded at 10 ft and was also observed at this depth in TP-4-05. In December 2005 the ground water surface had risen to a depth of 5 ft below the ground surface. This indicates a dramatic sensitivity to seasonal precipitation that was not observed in the other piezometers. The sensitivity of the ground water level at H-4-05 indicates that it is a perched water surface, and since it is shallow, it would be quicker to recharge from surface infiltration. It is likely perched on silty sands (see Fig. 5). Another contributing factor to the rapid rise in the ground water level is that boring H-4-05 occurs in a local, topographic depression; thus water tends to drain toward it.

4.3 SURFACE WATER

There are no perennial streams or existing ponds within the site. The primary surface water concern with regard to construction, and future performance of, the proposed structures and/or storm water facilities appears to be the discharge of water onto the portion of the site north of 32nd Ave. NE. Water is discharged onto the site via two existing, 18 in. (ID) concrete culverts. The culverts are side-by-side and are situated about 240 ft north of the intersection of 32nd Ave. NE with Marvin Road. The culverts are located within a natural drainage, as can be see in Figure 4. The culverts discharge water from storm water control facilities located on the site immediately east of Marvin Road. During a site visit (see below) significant flow only appeared to be issuing from the most northerly of the two culverts.

A site visit was made on January 7, 2006, to observe the extent of the surface water flowing onto the site. The region had been experiencing extensive rains prior to the site visit. The drainage course, roughly defined by the 200 ft contour (see Figure 4) was mostly

inundated. Surface water extended completely across the site, and it nearly filled the ditchline of the access road to the NWP warehouse facility, which is on the west side of the WSDOT parcel. The WSDOT site was generally dry north of H-7-05. The adjacent photo is looking south from H-7-05; the water in the background is up to 13 inches deep. Spot measurements at other locations between the culverts and H-7-05 indicated similar water depths.

5 GEOTECHNICAL RECOMMENDATIONS

5.1 DESIGN EARTHQUAKE PARAMETERS

For seismic design of buildings the 2003 *International Building Code* (IBC), Sections 1613 through 1615, should be used. This is as required by the WSDOT GDM.

5.2 LIQUEFACTION POTENTIAL

Liquefaction of saturated sands occurs when the sands are subject to cyclic loading. The cyclic loading causes the water pressure to increase in the sand reducing the intergranular stresses. As the intergranular stresses are reduced, the shearing resistance of the sand decreases. If pore pressures develop to the point where the effective stresses acting between the grains become zero, the soil will behave like a viscous fluid. Under this condition a soil layer loses part of its shear strength, and the result is usually rapid settlement. For deep foundations, downdrag forces will be generated as a result of settlements within and above the liquefied layer. Side capacity will also be lost in units over the liquefiable layer. Shallow footings founded within or above the liquefiable layer will be subject to significant settlements. Within the liquefied layer, there will be a loss of lateral support and of side resistance.

The liquefaction potential of saturated soils is evaluated mainly on soil gradation, relative density, and the depth of the deposit, i.e., the vertical effective overburden stress. The potential for liquefaction is highest for loose, fine to medium grained, sandy and silty soils. Increasing fines content, i.e., silt and clay, decreases the potential for liquefaction. If a deposit has greater than 35% fines it is usually considered to be non-liquefiable. Due to their high hydraulic conductivity, gravel soils are less susceptible to liquefaction, however, they can liquefy depending on their fines content, thickness, areal extent and/or the drainage conditions at their boundaries. The potential for liquefaction of all cohesionless, granular soils decreases with increasing depth and relative density.

At the site of the proposed Olympic Region Headquarters, the subsurface investigation and laboratory testing has not indicated the presence of any liquefiable soils. Although some units are below the water table, they consist primarily of dense to very dense silty sands and gravels. Consequently, they are not considered to be subject to liquefaction.

5.3 LIQUEFACTION INDUCED LATERAL SPREADING AND STRAIN

Due to either to the absence of liquefiable soils at the site or their location above the ground water table, we consider the risk of lateral spreading during an earthquake event to be insignificant.

5.4 Conceptual Recommendations for Building Foundations

5.4.1 Shallow Foundations

A shallow foundation system should be feasible for the proposed Olympic Region Headquarters structures, including the more highly loaded foundations of the Consolidated Shop Building. Shallow foundations are feasible for the site based primarily on the presence of dense to very dense cohesionless soils occurring essentially from the ground surface. Building foundation design should be in accordance with the 2003 International Building Code, as required by the GDM (Sec. 17.5.2).

The presence of dense material at the ground surface will require only minimal embedment depths to achieve adequate bearing capacities. Consequently, there will likely be no need for temporary shoring or sloping. Temporary shoring and sloping are discussed below. At most of the locations explored, there is a reasonable depth to the ground water table, hence its presence will not significantly reduce the available bearing capacity, nor will it lead to excessive settlements. The site has no severe relief; therefore it should not be necessary to situate footings within or on slopes.

5.4.2 Deep Foundations (Drilled Shafts and Driven Piles)

Due to the high relative density of site soils, it is unlikely that a deep foundation system will be required. However, unforeseen uplift loads, for example, could necessitate the use of a deep foundation system. Drilled shafts would be the most feasible deep foundation alternative. Driving piles into the dense material present at the site would be very difficult and is not recommended. Site specific borings that are drilled to the approximate tip elevation of the deep foundation elements should be completed for design and for constructability evaluation. Design of deep foundations for structures, should be in accordance with the 2003 International Building Code, as required by the GDM (Sec. 17.5.2).

5.5 Retaining Structures

Since the site is underlain by dense to very dense soils, a host of wall types are feasible. It is expected that most walls for this project will be fill walls. Cut walls are expected to be limited to shoring walls, if required, say for a deep basement excavation. *Standard Plan* concrete cantilever walls and geosynthetic walls should be feasible for this site. As noted above, it is expected that there will be few if any right-of-way concerns. Therefore, if used in a cut situation, temporary sloping of the excavation for the *Standard Plan* concrete cantilever walls would likely be feasible. A very significant advantage of the *Standard Plan* concrete cantilever walls is that most contractors are familiar with the techniques required to build them.

Other feasible walls that may be economical for this site include the pre-approved, proprietary MSE walls. These walls are generally cost competitive with the *Standard Plan* concrete cantilever walls, particularly when a traffic barrier is to be installed atop the MSE wall.

Gravel borrow or gravel backfill for walls should be used immediately behind all retaining walls. As noted below, on-site material will not be suitable for wall backfill. Positive drainage from behind the wall and for water on the backslope must also be provided for all walls.

5.6 STORM WATER FACILITIES

5.6.1 Infiltration Ponds

For ponds that are to be used as infiltration facilities, the infiltration rate should be evaluated using the methods outlined in Sec. 4-5 of the 2004 WSDOT *Highway Runoff Manual* (M31-16). Site specific exploration, including defining the seasonal fluctuation of the ground water surface, will be required for selected pond locations. Guidelines regarding exploration requirements are provided in the *Highway Runoff Manual* (HRM).

Based on the borings and water levels recorded to date, it appears that the vicinity of H-4-05 would not be a desirable site for an infiltration pond due to the seasonally high ground water table. The vicinity of borings H-5-05 and H-6-05 is generally higher than most of the site. Therefore without extensive earthwork, these areas would not be feasible sites for ponds. The area north of 32nd Ave. NE also may not be suitable for a pond due to the periodic inundation of this area, which was discussed above. The shallow silt layer in boring H-1-05 would control infiltration for a pond situated above this layer.

Currently, the area in the vicinity of the proposed structures (borings H-2-05 and H-3-05) appears to also be the most suitable area for pond locations. However, detailed analysis and testing will be needed to confirm this, especially in consideration of the very dense nature of the subsurface soils.

5.6.2 Detention Vaults

The generally moderate depth to the ground water table would make the use of detention vaults feasible for storm water detention. Depths to the ground water table were generally on the order of 20 to 30 feet. Hence vaults could be located above the water table, thus avoiding problems with uplift. Field investigation and geotechnical design for detention vaults should be done according to the GDM, Sec. 8.16. Hydrologic design of detention vaults is addressed in the *Highway Runoff Manual*.

5.7 PERMANENT CUTS AND EMBANKMENTS

Based on the presence of dense, cohesionless materials throughout the site, we are not anticipating stability problems for permanent cuts or moderate height embankments. Steep slopes are likely possible, but given the available space and the nature of the construction, oversteepened slopes to meet right-of-way, or other restrictions, are not anticipated. For embankment heights of less than 10 ft, we expect post-construction settlements to be insignificant.

5.8 TEMPORARY CUTS AND SHORING

Temporary cuts must be designed according to Part N, Sec. 296-155 of the Washington Administrative Code (WAC). Most of the surficial soils at the site can be considered Type B soils, as defined by the WAC and therefore, temporary cuts of up to 1:1 will likely be possible at most locations. Any cut with a vertical height over 20 ft must be designed by a geotechnical engineer who is licensed and registered in the State of Washington. Additional information regarding temporary cut slopes can be found in the GDM, Sec. 15.6.2 as well as the referenced portions of the WAC.

For cut applications, the shoring system most feasible at the Olympic Region Headquarters Building site will be a soldier pile and lagging system. Installation of sheet piles will not likely be feasible owing to the dense nature of on-site soils and the presence of cobbles and boulders.

5.9 Reuse of Onsite Materials

The proposed project is not expected to contain large cuts (or fills). Therefore, only soils in the top 10 ft of the profile were considered for their potential reuse as on-site fill materials. The grain size distributions of all the samples within 10 ft of the surface were evaluated to determine which borrow material criteria they met. However, because the bag samples retrieved from the test pits were the largest samples, they should be considered to be the most representative.

Many of the samples had grain size curves that were largely within the gravel or select borrow specification but the last 20-30 percent fell outside the range, usually because of a large fines content. Additionally, the surficial materials, as evidenced primarily by the test pit spoils, contain a significant fraction of plus 4 inch material that would require removal prior to use as structural fill. Moisture contents are relatively low, and in some cases may be near the optimum moisture content for these types of materials, i.e., generally cohesionless soils. However, due to the high fines content, most on-site soils will not be suitable as an all-weather material or for structural or wall backfill. Additionally, the necessity of screening out larger sizes will reduce the economic advantage of using on-site materials. Based primarily upon the test pit samples, the upper 5 ft of the soil profile contains primarily common borrow [*Standard Specifications* 9-03.14(3)].

6 CONSTRUCTION CONSIDERATIONS

Significant problems during the construction of shallow foundations for structures and walls are not anticipated for this site. A notable exception would be the construction of shallow foundations for structures with basements, in which case temporary shoring or sloping may be required.

Excavations for footings should be inspected prior to pouring the concrete. Loose areas should be excavated and replaced with compacted granular material. Although foundation soils are dense, their generally high fines content will cause them to be difficult to work with in wet weather. We would expect that construction dewatering would only be necessary for excavations deeper than 15-30 ft, except in the vicinity of H-4-05, where the ground water table was recorded as high as 5 ft below ground.

The high relative density and presence of cobble and boulder size material in site soils would be the primary factors that determine the performance of shaft construction. For shaft installation, foundation soils will be difficult to excavate due to the presence of cobbles and boulders, and therefore shaft construction should be anticipated to be slow. Cobbles and boulders that "roll" into the shaft may encourage additional sloughing of the shaft walls, resulting in enlarged shaft diameters. Ground water occurred about 15 to 30 ft below existing grade; hence wet shaft construction methods will be required for shafts that extend below the ground water surface.

7 INTENDED REPORT USE AND LIMITATIONS

This report has been prepared to assist the Washington State Department of Transportation in the engineering design and construction of the subject project. It should not be used, in part or in whole for other purposes without contacting the E&EP Geotechnical Division for a review of the applicability of such reuse. This report should be made available to prospective contractors for their information or factual data only and not as a warranty of ground conditions.

The conclusions and recommendations contained in this report are based on the Geotechnical Division's understanding of the project at the time that the report was written and on site conditions that existed at the time of the field exploration. If significant changes to the nature, configuration, or scope of the project occur during the design process, the Geotechnical Division should be consulted to determine the impact of such changes on the recommendations and conclusions presented in this report.

8 CLOSURE

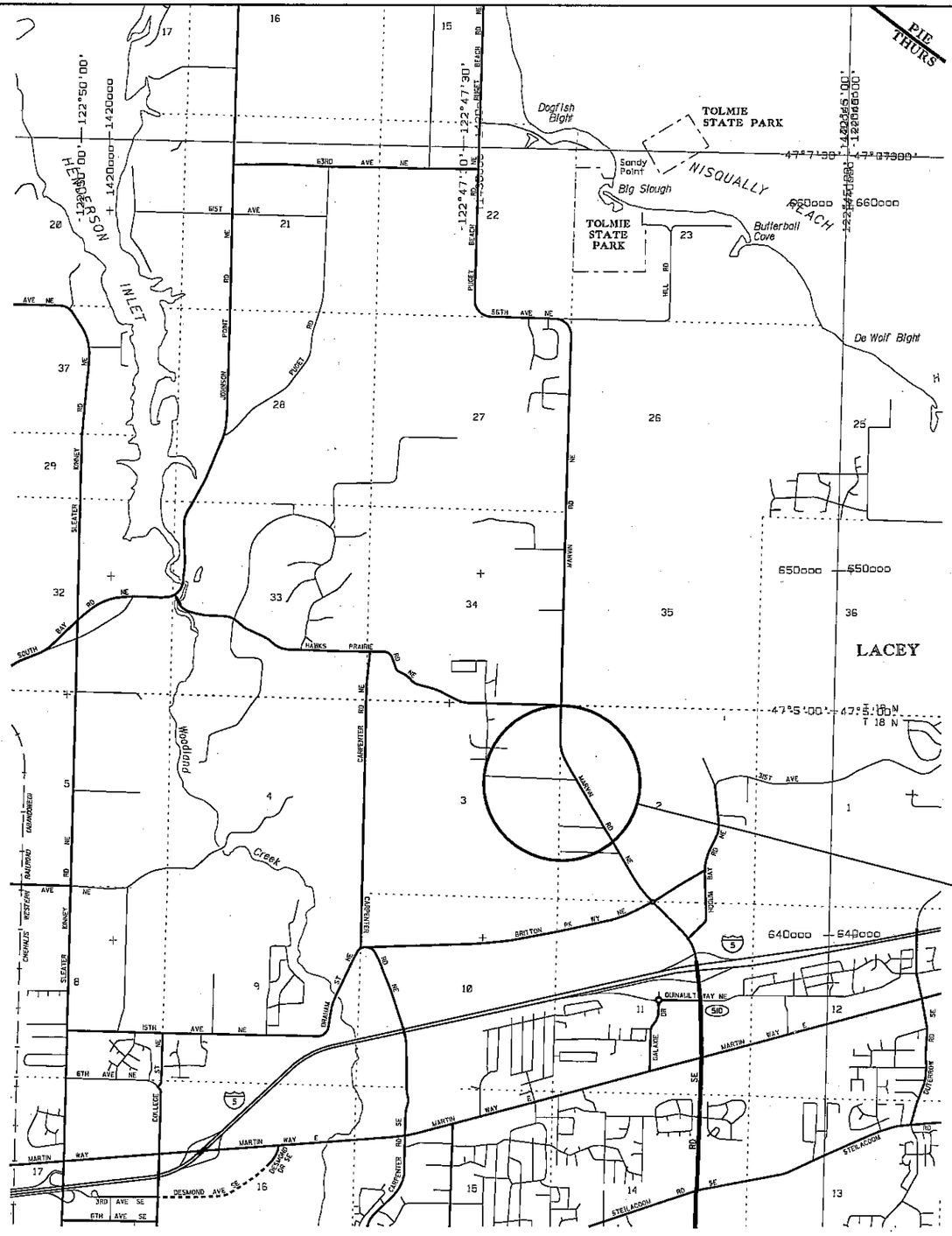
If you have any questions or require further information, please contact Tony Allen at 360.709.5450 or Todd Mooney at 360.709.5463.

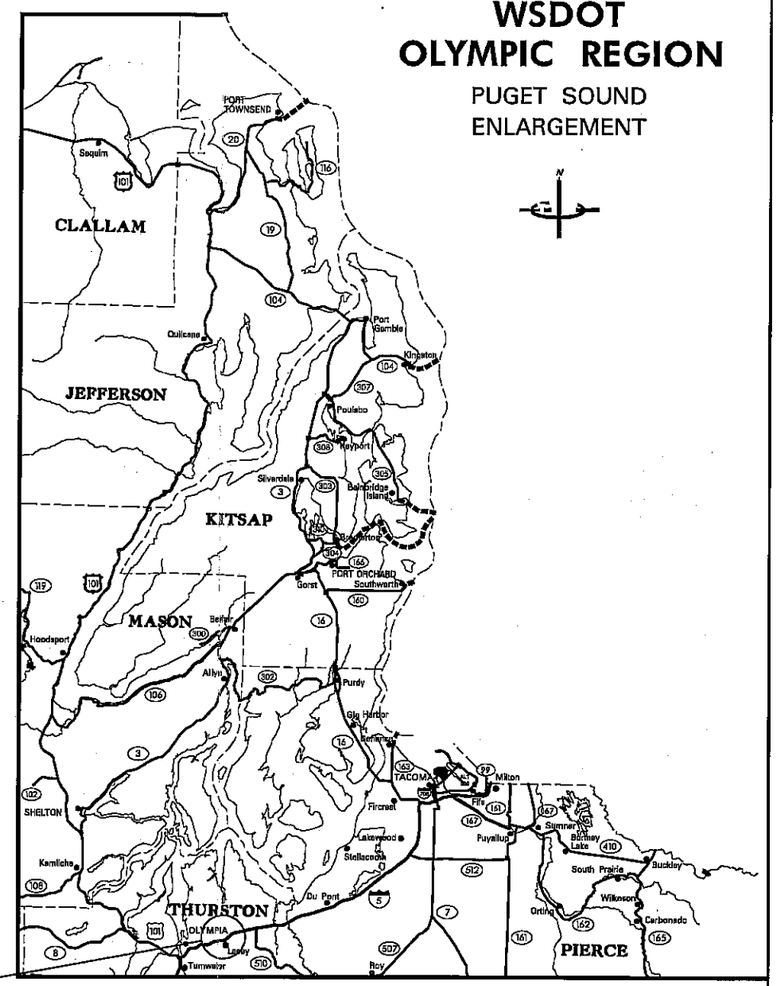
9 REFERENCES

Logan, R.L., Walsh, T.J, Schasse, H.W., and Polenz, M. (2003) *Geologic Map of the Lacey 7.5 – minute Quadrangle, Thurston County, Washington*, Washington Division of Geology and Earth Resources, Open File Report 2003-9.

Pringle, R.F. (1990) *Soil Survey of Thurston County, Washington*, United States Department of Agriculture.

FIGURES





LACEY

Figure 1: Vicinity Map

JOB BE0034 S.R. _____ C.S. _____

Olympic Region Headquarters Replacement

WASHINGTON STATE
TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
T. E. BAKER MATERIALS ENGINEER

DATE 1/2006
SCALE N.T.S. VERT. HORIZ.
SHEET ___ OF ___
DRAWN BY WM

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SITE PLAN APPLICATION CRITERIA

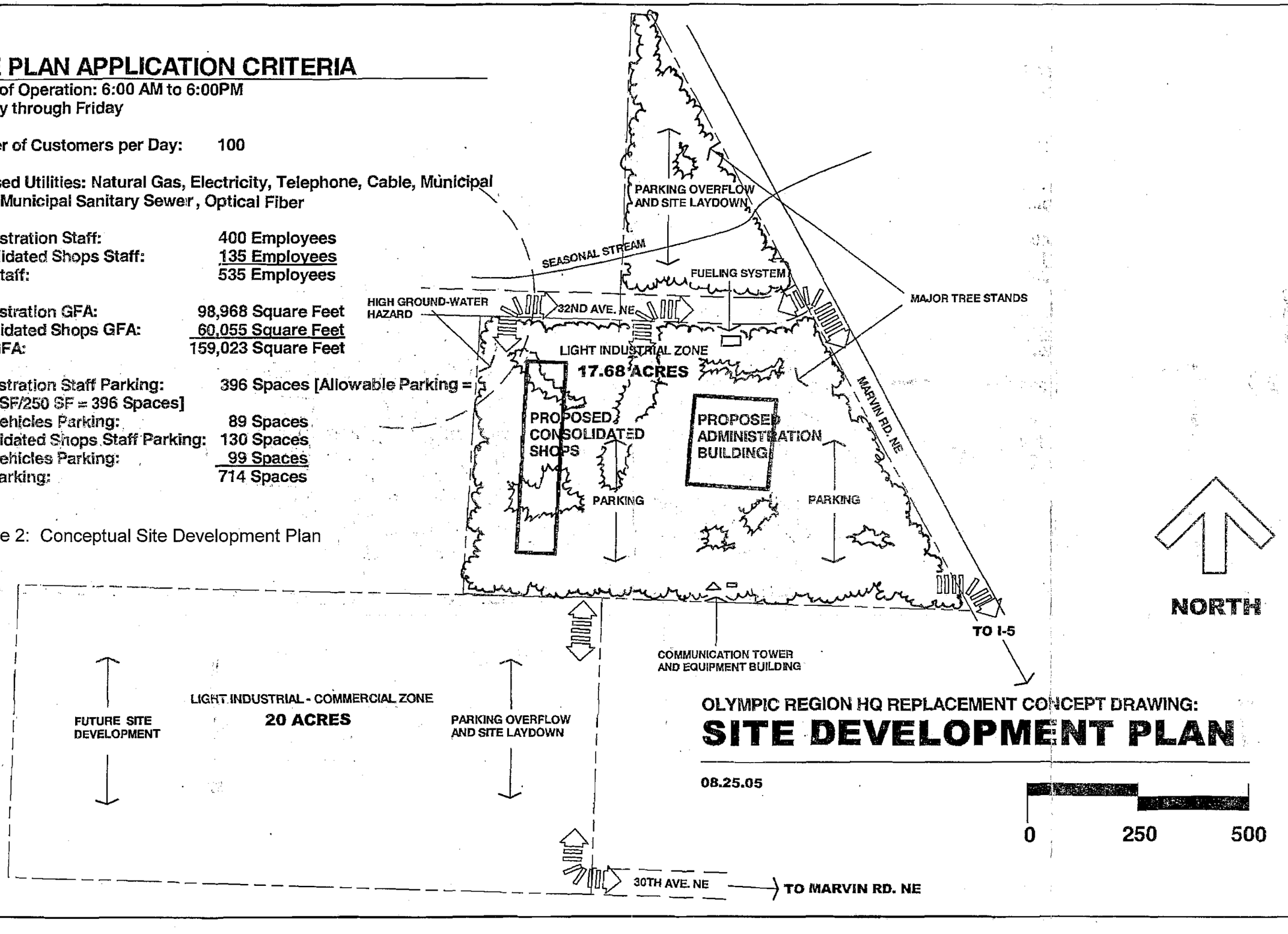
Hours of Operation: 6:00 AM to 6:00PM
Monday through Friday

Number of Customers per Day: 100

Proposed Utilities: Natural Gas, Electricity, Telephone, Cable, Municipal Water, Municipal Sanitary Sewer, Optical Fiber

Administration Staff:	400 Employees
Consolidated Shops Staff:	135 Employees
Total Staff:	535 Employees
Administration GFA:	98,968 Square Feet
Consolidated Shops GFA:	60,055 Square Feet
Total GFA:	159,023 Square Feet
Administration Staff Parking:	396 Spaces [Allowable Parking = 98,968 SF/250 SF = 396 Spaces]
State Vehicles Parking:	89 Spaces
Consolidated Shops Staff Parking:	130 Spaces
State Vehicles Parking:	99 Spaces
Total Parking:	714 Spaces

Figure 2: Conceptual Site Development Plan



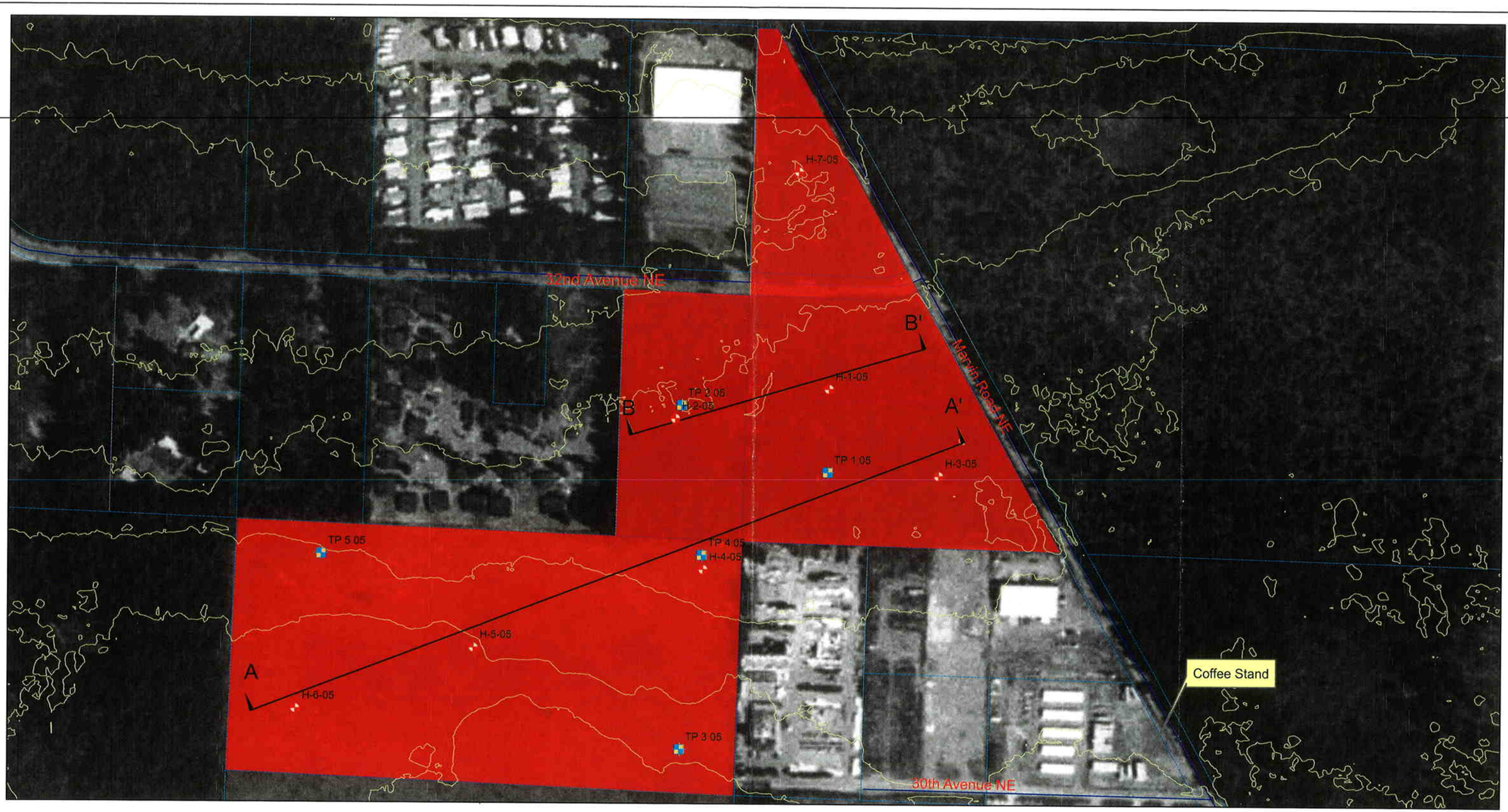


Figure 3 - Site Map and Exploration Locations

Job BE 0034 S.R. NA C.S.

Olympic Region Headquarters Replacement

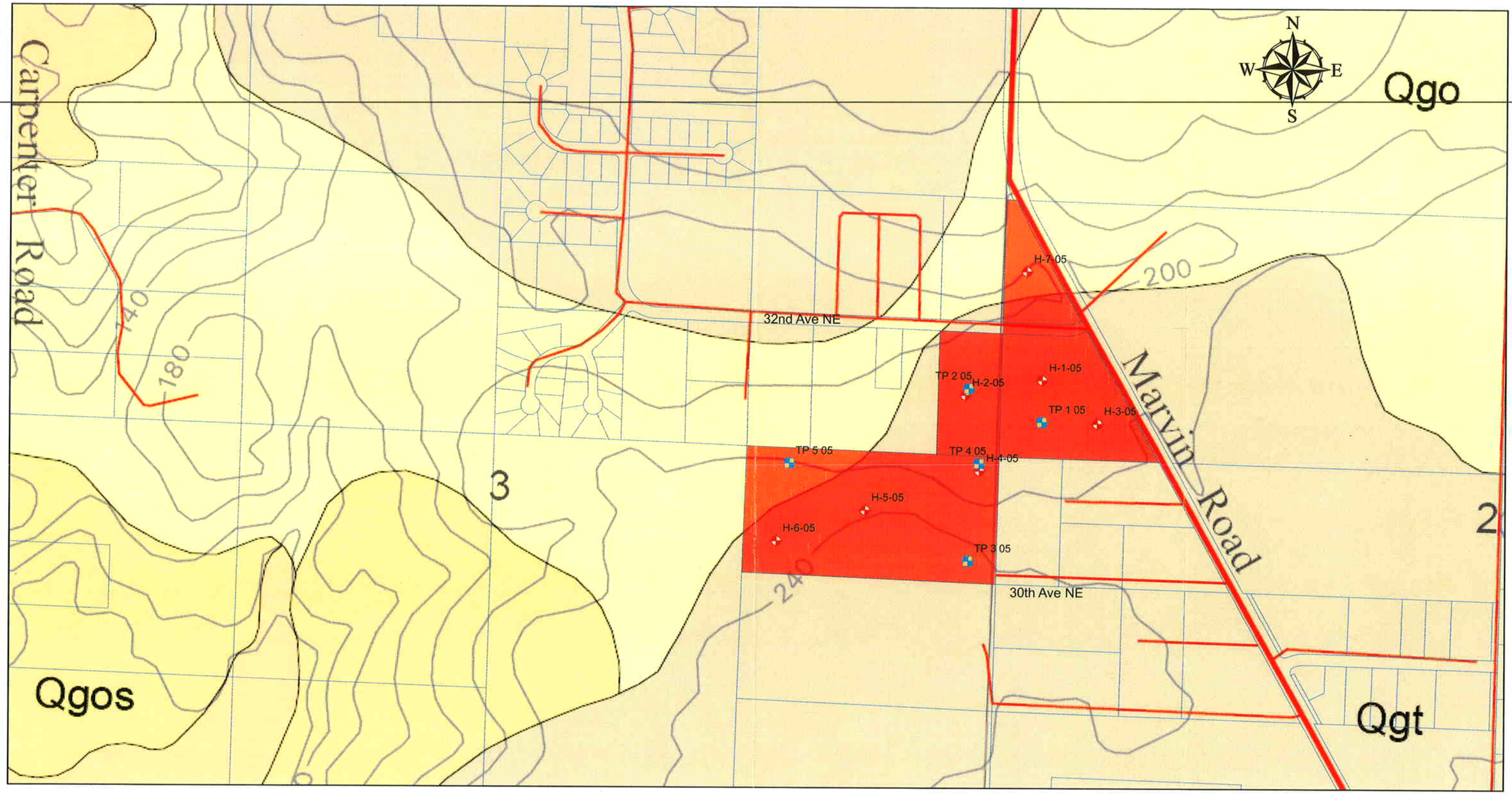
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Geotechnical Services Division

Date Jan 2006

Scale

Sheet 1 of 1



Qgos — Latest Vashon recessional sand and minor silt - Moderately wells sorted, moderately to well-rounded, fine- to medium-grained sand with minor silt; noncohesive and highly permeable; thickness inferred from wells reaches up to 100 ft.

Qgo — Vashon recessional outwash—Recessional and proglacial stratified, moderately to well-rounded, poorly to moderately sorted outwash sand and gravel of northern or mixed northern and Cascade source, locally containing silt and clay; also contains lacustrine deposits and ice-contact stratified drift.

Qgt — Vashon till—Unstratified and, in most exposures, highly compacted mixture of clay, silt, sand, and gravel deposited directly by glacier ice; gray where fresh and light yellowish brown where stained; unsorted and, in most exposures, of very low permeability;

425 212.5 0 425 850 1,275 1,700 Feet

Figure 4 - Project Area Geology

(Source: WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES OPEN FILE REPORT 2003-9, North American Datum of 1927)

Job BE 0034 S.R. NA C.S.

Olympic Region Headquarters Replacement

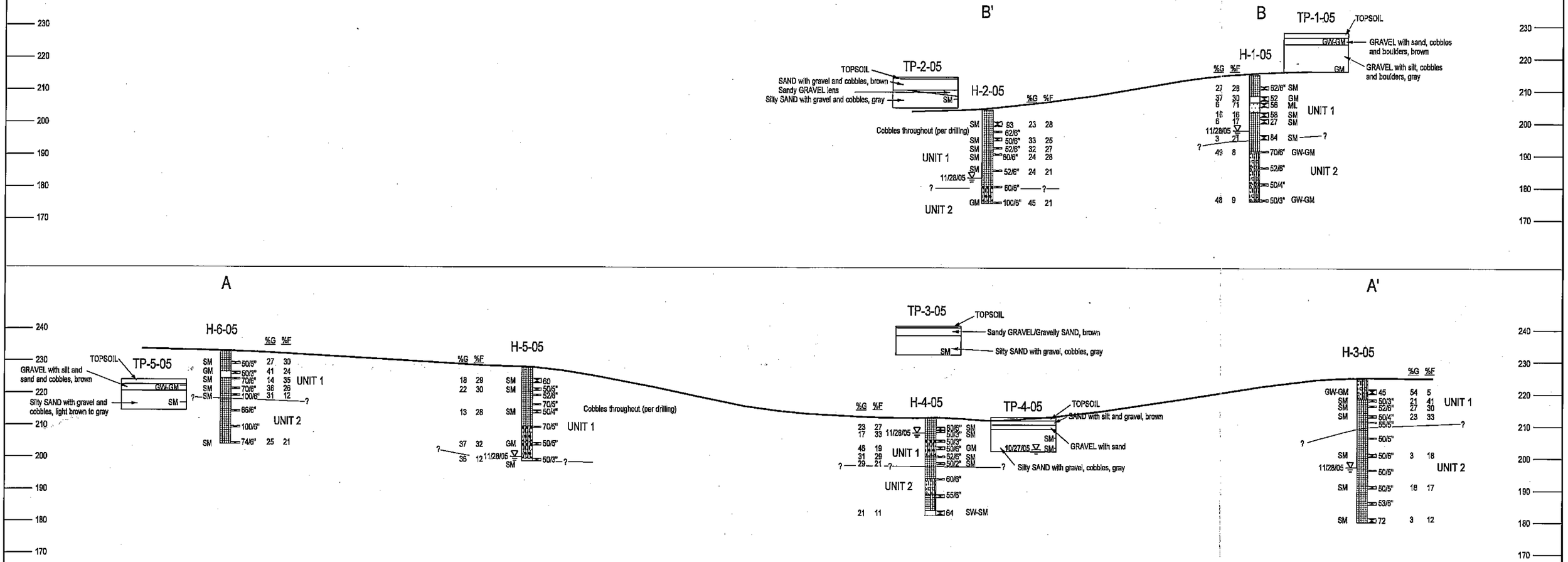
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Geotechnical Services Division

Date Jan 2006

Scale

Sheet 1 of 1



UNIT 1: Silty SAND with gravel, cobbles and boulders (Avg fines content=24%)
UNIT 2: Silty SAND with gravel, cobbles and boulders and GRAVEL (Avg fines content=17%)

TEST HOLE LEGEND

H-1-04 TEST HOLE NUMBER
110+55 TEST HOLE STATION
26 ft.Rt. TEST HOLE OFFSET
23 STANDARD PENETROMETER TEST (BLOWS PER FOOT)
8/5/04 WATER LEVEL & DATE
UNDISTURBED SAMPLE
SOIL/ROCK STRATA AS DEFINED ON BORING LOG
INDICATES CORE SAMPLE TAKEN
ROCK QUALITY DESIGNATION IN %

Figure 5: Borings

JOB BE0034 S.R. _____ C.S. _____

Olympic Region Headquarters Replacement

WASHINGTON STATE TRANSPORTATION COMMISSION
DEPARTMENT OF TRANSPORTATION
MATERIALS BRANCH
T. E. BAKER MATERIALS ENGINEER

DATE 12/2005
SCALE 1=30' VERT.
1=30' HORIZ.
SHEET ____ OF ____
DRAWN BY WM

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APPENDIX A: Boring Logs

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-1-05

Job No. BE-0034 SR _____ Elevation 215.0 ft (65.5 m)

Sheet 1 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address 32 Ave NE & Marvin Rd.

Inspector Bill Hanning

Start October 27, 2005 Completion October 27, 2005 Well ID# _____

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 5"

Method Wet Rotary

Northing 644009.9 Easting 1072465.8 Latitude _____

Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				48 62/6" (62/6")		D-1	GS MC	SM, M.C. = 12% Silty SAND with gravel, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
				26 27 25 (52)		D-2	GS MC	GM, M.C. = 10% Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
				12 17 39 (56)		D-3	GS MC AL	ML, M.C. = 24%, PI = NP SILT with sand, some gravel, very dense, olive brown, wet, Stratified, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.5 ft		
				18 26 32 (58)		D-4	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, olive gray, moist, Stratified, no HCl reaction Length Recovered 1.2 ft, Length Retained 1.2 ft		
				13 13 14 (27)		D-5	GS MC	SM, M.C. = 16% Silty SAND, with poorly graded sand strati & some sand, dense, olive brown, wet, Stratified, no HCl reaction Length Recovered 1.2 ft, Length Retained 1.2 ft	12/23/2005	
				27 32 52 (84)		D-6	GS MC	SM, M.C. = 19% Silty SAND, strati and trace gravel, very dense, olive gray, wet, Stratified, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.5 ft		

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06 11:25:49 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-1-05

Job No. BE-0034 SR _____ Elevation 215.0 ft (65.5 m)

Sheet 2 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	7								
		>>	70/6" (70/6")		D-7	GS MC	GW-GM, M.C. = 8% Well graded GRAVEL with silt and sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
25	8								
		>>	52/6" (52/6")		D-8		Well graded GRAVEL with silt and sand, subrounded, very dense, gray, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
30	9								
	10		40 50/4" (50/4")		D-9		Well graded GRAVEL with silt and sand, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.6 ft, Length Retained 0.6 ft		
35	11								
			44 50/3" (50/3")		D-10	GS MC	GW-GM, M.C. = 7% Well graded GRAVEL with silt and sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
	12								
40							End of test hole boring at 39.2 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bailed to 36.0 ft (slow recharge) Peizometer reading 21.0 ft WATER LEVEL READINGS DATE DEPTH		
	13								
45									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06,11:25:50 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-1-05

Job No. BE-0034 SR _____ Elevation 215.0 ft (65.5 m)

Sheet 3 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								11/28/2005 -17.2 12/23/2005 -16.3		
	14									
	15									
50										
	16									
55										
	17									
	18									
60										
	19									
65										
	20									
	21									
70										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06,11:25:50 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-2-05

Sheet 1 of 2

Job No. BE-0034 SR _____ Elevation 204.0 ft (62.2 m)

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address 32 Ave NE & Marvin Rd.

Inspector Bill Hanning

Start October 26, 2005 Completion October 26, 2005 Well ID# AKK-351

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 5"

Method Wet Rotary

Northing 643931.5 Easting 1072063.5 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	1	>>	47 43 50 (93)		D-1	GS MC	SM, M.C. = 11% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.5 ft, Length Retained 1.5 ft		
5	2	>>	62/6" (60/6")		D-2		Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
			31 50/6" (50/6")		D-3	GS MC	SM, M.C. = 9% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
10	3	>>	52/6" (52/6")		D-4	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
	4	>>	60/6" (60/6")		D-5	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
15	5								
	6	>>	52/6" (52/6")		D-6	GS MC	SM, M.C. = 12% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
20									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:38 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-2-05

Job No. BE-0034 SR _____ Elevation 204.0 ft (62.2 m)

Sheet 2 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								12/23/2005	▽	
25	7		>>	60/6" (60/6")		D-7	GS MC	Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.4 ft, Length Retained 0.4 ft		
	8									
30	9		>>	100/6" (100/6")		D-8		GM, M.C. = 9% Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
	10							End of test hole boring at 29 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
35	11							Note: Drilling indicated large gravel from surface to depth, possible cobbles. Bailed dry before install. Water reading after install was at 21.0 ft.		
	12							WATER LEVEL READINGS DATE — DEPTH 10/27/2005 — 21.1 11/28/2005 — -21.0 12/23/2005 — -20.9		
40	13									
45										

SOIL_BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:38 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-3-05

Job No. BE-0034 SR _____ Elevation 225.0 ft (68.6 m)

Sheet 1 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address 32nd Ave. N.E. and Marvin Rd.

Inspector Brian Hilts

Start October 31, 2005 Completion November 1, 2005 Well ID# AKK-352

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 4"x32' Method Wet Rotary

Northing 643783.5 Easting 1072752.7 Latitude _____ Longitude _____

County Thurston Subsection NW SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			18 21 24 (45)		D-1	GS MC	GW-GM, M.C. = 8% Well graded GRAVEL with silt and sand, angular, dense, grayish brown, moist, Homogeneous, HCl reaction not tested. Length Recovered 1.1 ft, Length Retained 1.1 ft		
	2			22 50/3" (50/3")		D-2	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	3		>>	52/6" (52/6")		D-3	GS MC	SM, M.C. = 9% Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.5 ft, Length Retained 0.5 ft		
	4			24 50/4" (50/4")		D-4	GS MC	SM, M.C. = 12% Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
15	5		>>	55/5" (55/5")		D-5		Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.4 ft, Length Retained 0.4 ft		
20	6			50/5" (50/5")		D-6		Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.4 ft, Length Retained 0.4 ft		

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:39 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-3-05

Job No. BE-0034 SR _____ Elevation 225.0 ft (68.6 m)

Sheet 2 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	7		36 50/6" (50/6")		D-7	GS MC	SM, M.C. = 16% Silty SAND, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
25	8								
			50/5" (50/5")		D-8		Silty SAND with gravel, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.4 ft, Length Retained 0.4 ft		
30	9						12/23/2005	▽	
	10		40 50/5" (50/5")		D-9	GS MC	SM, M.C. = 14% Silty SAND with gravel, very dense, grayish brown, moist, Stratified, HCl reaction not tested, Stratified with sand. Length Recovered 0.8 ft, Length Retained 0.8 ft		
35	11								
		>>	33 53/6" (53/6")		D-10		Silty SAND, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
40	12								
	13								
		>>	23 34 38 (72)		D-11	GS MC	SM, M.C. = 13% Silty SAND, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.3 ft, Length Retained 1.3 ft		
45									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:39 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-3-05

Job No. BE-0034 SR _____ Elevation 225.0 ft (68.6 m)

Sheet 3 of 3

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
50	14							End of test hole boring at 45 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. The water table inside the casing after drilling was at 6.4'. We bailed the hole to 43.5', 10 min. later the water table was at 43.5'. WATER LEVEL READINGS DATE DEPTH 11/28/2005 -27.80 12/23/2005 -30.1		
	15									
55	16									
	17									
60	18									
	19									
65	20									
	21									
70										

SOIL_BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:39 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-4-05

Job No. BE-0034 SR _____ Elevation 212.5 ft (64.8 m)

Sheet 1 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Dan Henderson Lic# 2742 T

Site Address Marvin Rd. & 30th Ave.NE.

Inspector Joe Judd

Start October 25, 2005 Completion October 25, 2005 Well ID# AKK-353

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 4.0

Method Wet Rotary

Northing 643535.9 Easting 1072138.9 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				>> 35 80/6" (80/6")		D-1	GS MC	SM, M.C. = 17% Silty SAND with gravel, very dense, olive brown, moist, Homogeneous, no HCl reaction, material mottled, with FeO stains present Length Recovered 0.8 ft, Length Retained 0.8 ft		
5	1			45 50/3" (50/3")		D-2	GS MC	SM, M.C. = 12% Silty SAND with gravel, very dense, light olive brown, moist, Homogeneous, no HCl reaction Length Recovered 0.8 ft, Length Retained 0.8 ft 12/23/2005	▽	
	2			37 50/3" (50/3")		D-3		Silty GRAVEL with sand, very dense, olive gray, moist, Homogeneous, no HCl reaction, color change in material Length Recovered 0.6 ft, Length Retained 0.6 ft		
10	3			32 50/6" (50/6")		D-4	GS MC	GM, M.C. = 8% Silty GRAVEL with sand, subangular, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.9 ft, Length Retained 0.9 ft		
	4			>> 62/6" (62/6")		D-5	GS MC	SM, M.C. = 11% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
15	5			38 50/2" (50/2")		D-6	GS MC	SM, M.C. = 11% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.6 ft, Length Retained 0.6 ft		
				>> 60/6" (60/6")		D-7		Well graded GRAVEL with silt and sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl		
20	6									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:40 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-4-05

Job No. BE-0034 SR _____ Elevation 212.5 ft (64.8 m)

Sheet 2 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Dan Henderson Lic#. 2742 T

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								reaction Length Recovered 0.3 ft, Length Retained 0.3 ft 19.6 ft. - 24.0 ft. heavy gravels as indicated by drilling		
	7									
			>>	27 55/6" (55/6")		D-8		Poorly graded SAND with silt, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
25	8									
			>>	49 22 42 (64)		D-9	GS MC	SW-SM, M.C. = 13% Well graded SAND with silt and gravel, very dense, dark grayish brown, moist, Homogeneous, no HCl reaction Length Recovered 1.1 ft, Length Retained 1.1 ft		
30	9							End of test hole boring at 30.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. Bailed from 4.3 to 26.0 ft. 10 min recharge to 25.5 ft. 45 min later water dropped to 26.9 ft. WATER LEVEL READINGS DATE DEPTH 10/27/2005 -9.84 11/28/2005 -4.8 12/23/2005 -4.9		
	10									
35	11									
	12									
40										
	13									
45										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:40 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-5-05

Sheet 1 of 2

Job No. BE-0034 SR _____ Elevation 228.0 ft (69.5 m)

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address Marvin Rd. & 30th Ave.NE.

Inspector Bill Hanning

Start October 25, 2005 Completion October 25, 2005 Well ID# AKK-354

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 5"

Method Wet Rotary

Northing 643328.5 Easting 1071540.8 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								Note during the course of drilling, the drill behavior indicated large gravel and possible cobbles from surface to bottom of hole.		
5	1		>>	28 28 32 (60)		D-1	GS MC	SM, MC=12% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 1.0 ft, Length Retained 1.0 ft		
	2			40 50/5" (50/5")		D-2	GS MC	SM, MC=12% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	3		>>	52/6" (52/6")		D-3		Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
	4		>>	70/5" (70/5")		D-4		Silty SAND, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		
15	5			50 50/4" (50/4")		D-5	GS MC	SM, MC=11% Silty SAND, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.8 ft, Length Retained 0.8 ft		
20	6		>>	70/5" (70/5")		D-6		Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.3 ft, Length Retained 0.3 ft		

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06 11:27:11 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-5-05

Job No. BE-0034 SR _____ Elevation 228.0 ft (69.5 m)

Sheet 2 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
25	7			32 50/5" (50/5")		D-7	GS MC AL	GM, MC=10%, PI=NA Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.8 ft, Length Retained 0.8 ft		
	8								12/23/2005	
30	9			47 50/3" (50/3")		D-8	GS MC	SM, MC=9% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction. Length Recovered 0.7 ft, Length Retained 0.7 ft		
								End of test hole boring at 29.3 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
35	10							Bailed hole to 25.4 ft. 20 minute recharge to 17.3 ft. Bailed hole to 27.9 ft. 20 minute recharge to 25.0 ft.		
	11							WATER LEVEL READINGS DATE 10/27/2005 DEPTH -27 11/28/2005 -27.9 12/23/2005 -27.8		
40	12									
	13									
45										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06 11:27:11 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-6-05

Sheet 1 of 2

Job No. BE-0034 SR _____ Elevation 233.0 ft (71.0 m)

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address Marvin Rd. & 30th Ave NE

Inspector Bill Hanning

Start October 24, 2005 Completion October 24, 2005 Well ID# AKK-355

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 5"

Method Wet Rotary

Northing 643166.6 Easting 1071080.7 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
5	1			40 50/5" (50/5")		D-1	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, olive brown, moist, Homogeneous, no HCl reaction Length Recovered 0.8 ft, Length Retained 0.8 ft		
	2			48 50/3" (50/3")		D-2	GS MC	GM, M.C. = 8% Silty GRAVEL with sand, subrounded, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.7 ft, Length Retained 0.7 ft		
10	3		>>	70/6" (70/6")		D-3	GS MC	SM, M.C. = 9% Silty SAND, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
	4		>>	70/6" (70/6")		D-4	GS MC	SM, M.C. = 9% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
15	5		>>	100/6" (100/6")		D-5	GS MC	SM, M.C. = 9% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
20	6		>>	66/6" (66/6")		D-6		Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06 10:26:41 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68301

HOLE No. H-6-05

Job No. BE-0034 SR _____ Elevation 233.0 ft (71.0 m)

Sheet 2 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
	7			>> 100/6" (100/6")		D-7		Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
25	8			>> 74/6" (74/6")		D-8	GS MC	SM, M.C. = 10% Silty SAND with gravel, very dense, olive gray, moist, Homogeneous, no HCl reaction Length Recovered 0.5 ft, Length Retained 0.5 ft		
30	9							End of test hole boring at 29 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
	10							WATER LEVEL READINGS DATE — DEPTH 10/27/2005 — Dry 11/28/2005 — Dry 12/23/2005 — Dry		
35	11									
	12									
40	13									
45										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:42 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-7-05

Job No. BE-0034 SR _____ Elevation 202.5 ft (61.7 m)

Sheet 1 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Site Address 32nd Ave. N.E. and Marvin Rd.

Inspector Brian Hilts

Start November 1, 2005 Completion November 2, 2005 Well ID# AKK-356

Equipment CME 850 w/ autohammer

Station _____ Offset _____ Casing 4'x32'

Method Wet Rotary

Northing 644579.7 Easting 1072384.1 Latitude _____ Longitude _____

County Thurston Subsection NW SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				17 20 16 (36)		D-1	GS MC	SM, M.C. = 10% Silty SAND with gravel, cobbles, dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 1.0 ft, Length Retained 1.0 ft		
5	1			9 6 8 (14)		D-2		Well graded GRAVEL with silt and sand, subrounded, medium dense, grayish brown, wet, Homogeneous, HCl reaction not tested Length Recovered 0.6 ft, Length Retained 0.6 ft		
	2			13 20 23 (43)		D-3	GS MC	GW-GM, M.C. = 10% Well graded GRAVEL with silt and sand, angular, dense, grayish brown, moist, Homogeneous, HCl reaction not tested Length Recovered 0.8 ft, Length Retained 0.8 ft		
10	3		>>	24 23 31 (54)		D-4	GS MC	SW-SM, M.C. = 13% Well graded SAND with silt, very dense, grayish brown, moist, HCl reaction not tested, With a trace of gravel. Stratified with silty sand. Length Recovered 1.1 ft, Length Retained 1.1 ft		
	4		>>	22 28 32 (60)		D-5	GS MC	SM, M.C. =10% Silty SAND, very dense, grayish brown, moist, Homogeneous, HCl reaction not tested, With a trace of gravel. Length Recovered 0.8 ft, Length Retained 0.8 ft The morning of 11/02/05 the water table inside the casing was at 17.5 ft.		
15	5		>>	28 43		D-6	GS MC	SW-SM, M.C. = 11% Well graded SAND with silt and gravel, very dense,		
20	6									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:26:42 A1

Washington State Department of Transportation

LOG OF TEST BORING

Start Card R-68302

HOLE No. H-7-05

Job No. BE-0034 SR _____ Elevation 202.5 ft (61.7 m)

Sheet 2 of 2

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller Vince Johnson Lic# 2532

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
				31 (74)				grayish brown, moist, Homogeneous, HCl reaction not tested. Length Recovered 1.2 ft, Length Retained 1.2 ft		
	7									
				31 34 16 (50)		D-7		Well graded SAND with silt and gravel, dense, grayish brown, moist, Stratified, HCl reaction not tested, the bottom .3' was silty sand. Length Recovered 1.1 ft, Length Retained 1.1 ft		
25	8									
			>>	14 23 48 (71)		D-8	GS MC	SW-SM, M.C. = 13% Well graded SAND with silt and gravel, very dense, grayish brown, wet, Homogeneous, HCl reaction not tested Length Recovered 1.1 ft, Length Retained 1.1 ft		
30	9									
	10							End of test hole boring at 30.5 ft below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. The water table inside the casing after drilling was at 3.2 ft. Bailed the hole to 24.4 ft. 10 min. later the water table was at 18 ft. After the piezometer installation, the water table was at 14.7 ft. WATER LEVEL READINGS DATE — DEPTH 11/28/2005 — Dry 12/23/2005 — Dry		
35	11									
	12									
40										
	13									
45										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06 10:26:43 A1

APPENDIX B: TEST PIT LOGS AND PHOTOGRAPHS

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

HOLE No. TP-1-05

Job No. BE-0034 SR _____ Elevation 228.0 ft (69.5 m)

Sheet 1 of 1

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller _____ Lic# _____

Site Address _____

Inspector Todd Mooney

Start October 27, 2005 Completion October 27, 2005 Well ID# _____

Equipment Case CX130 Excavator

Station _____ Offset _____ Casing _____

Method Test Pit

Northing 643791.1 Easting 1072463.5 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								SAND with silt, brown, organics, moist (Topsoil).		
								GRAVEL with sand, cobbles and boulders, brown, moist.		
	1					B-1 B-1-A	GS MC	GW-GM (for Gradation Bag sample B-1) Well graded GRAVEL with silt and sand. M.C. = 5%		
5										
	2							1 ft. diameter boulder at 8 ft.		
10	3					B-2 B-2-A	GS MC	GM (for Gradation Bag sample B-2) Silty SAND with gravel. M.C. = 7%		
	4							End of Test Pit at 12.0 feet below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
15										
	5							No Groundwater was Encountered.		
20	6									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06 10:51:05 A1

Figure B.1: TP-1-05

Figure B.2: Boulder recovered from TP-1-05

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

HOLE No. TP-2-05

Job No. BE-0034 SR _____ Elevation 214.5 ft (65.4 m)

Sheet 1 of 1

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller _____ Lic# _____

Site Address _____

Inspector Todd Mooney

Start October 27, 2005 Completion October 27, 2005 Well ID# _____

Equipment Case CX130 Excavator

Station _____ Offset _____ Casing _____

Method Test Pit

Northing 643966 Easting 1072080.5 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								Duff		
								SAND with gravel and cobbles, brown Organics (roots), moist. Lens of clean Sandy GRAVEL at 2.3 ft. (see Test Pit photo).		
	1					B-1	MC	M.C. = 2%		
5										
	2					B-2 B-2-A	GS MC	SM Silty SAND with gravel, cobbles generally ≤ 4 in. occasional boulders, gray, moist. M.C. = 7%		
10	3							End of Test Pit at 9.5 feet below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. No Groundwater was Encountered.		
	4									
15	5									
	6									
20										

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06,10:51:06 A1

Figure B.3: TP-2-05

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

HOLE No. TP-3-05

Job No. BE-0034 SR _____ Elevation 241.3 ft (73.5 m)

Sheet 1 of 1

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller _____ Lic# _____

Site Address _____

Inspector Todd Mooney

Start October 27, 2005 Completion October 27, 2005 Well ID# _____

Equipment Case CX130 Excavator

Station _____ Offset _____ Casing _____

Method Test Pit

Northing 643063.7 Easting 1072079 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								SILT with sand, fine roots throughout, moist.		
								Sandy GRAVEL, Gravelly SAND with cobbles, roots, brown to tan, moist.		
	1					B-1 B-1-A	GS MC	SW-SM Well graded SAND with silt and gravel, with cobbles, generally ≤ 4 in.; gray, moist. M.C. = 3%		
5	2									
						B-2 B-2-A	GS MC	SM Silty SAND with gravel and cobbles. M.C. = 6%		
10	3							End of Test Pit at 9.0 feet below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. No Groundwater was Encountered.		
	4									
15	5									
20	6									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06,11:23:55 A1

Figure B.4: TP-3-05

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

HOLE No. TP-4-05

Job No. BE-0034 SR _____ Elevation 219.5 ft (66.9 m)

Sheet 1 of 1

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller _____ Lic# _____

Site Address _____

Inspector Todd Mooney

Start October 27, 2005 Completion October 27, 2005 Well ID# _____

Equipment Case CX130 Excavator

Station _____ Offset _____ Casing _____

Method Test Pit

Northing 643573 Easting 1072135.5 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								SAND with silt, roots throughout, dark brown, moist, (Topsoil).		
								SAND with silt and gravel, tan, moist.		
	1							GRAVEL with sand.		
5	2					B-1 B-1-A	GS MC	SM Silty SAND with gravel, cobbles and occasional boulders, gray, moist. M.C. = 8%		
10	3					B-2 B-2-A	GS MC	SM Silty SAND with gravel, cobbles and occasional boulders, gray, moist. M.C. = 10% 10/27/2005	▽	
	4							End of Test Pit at 10.6 feet below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data.		
15	5									
20	6									

SOIL BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/13/06,11:24:51 A1

Figure B.5: TP-4-05

Figure B.6: TP-4-05, Close-up of Water Seepage

Washington State Department of Transportation

LOG OF TEST BORING

Start Card _____

HOLE No. TP-5-05

Job No. BE-0034 SR _____ Elevation 224.0 ft (68.3 m)

Sheet 1 of 1

Project Olympic Region Headquarters Replacement, Geotechnical Baseline Report

Driller _____ Lic# _____

Site Address _____

Inspector Todd Mooney

Start October 27, 2005 Completion October 27, 2005 Well ID# _____ Equipment Case CX130 Excavator

Station _____ Offset _____ Casing _____ Method Test Pit

Northing 643573.4 Easting 1071146 Latitude _____ Longitude _____

County Thurston Subsection NW/SW Section 2 Range 1 W Township 18 N

Depth (ft)	Meters (m)	Profile	Standard Penetration Blows/ft (10 20 30 40)	SPT Blows/6" (N)	Sample Type	Sample No. (Tube No.)	Lab Tests	Description of Material	Groundwater	Instrument
								SILT with sand and gravel, fine roots throughout, brown, moist.		
						B-1 B-1-A	GS MC	GW-GM Well graded GRAVEL with silt and sand, cobbles, brown, moist. M.C. = 7% Very difficult to excavate below 3.5 ft.		
5	1									
	2					B-2 B-2-A	GS MC	SM Silty SAND with gravel and cobbles, generally ≤ 4 in., light brown to gray. M.C. = 7%		
10	3							End of Test Pit at 9.5 feet below ground elevation. This is a summary Log of Test Boring. Soil/Rock descriptions are derived from visual field identifications and laboratory test data. No Groundwater was Encountered.		
	4									
15	5									
20	6									

SOIL_BE-0034 OLYMPIC REGION HQ REPLACEMENT GEOTECHNICAL BASELINE REPORT.GPJ SOIL.GDT 1/9/06 10:51:07 A1

Figure B.7: TP-5-05

APPENDIX C: Laboratory Test Results

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Project **Olympic Region Headquarters Replacement, Geotechnical Baseline Report**

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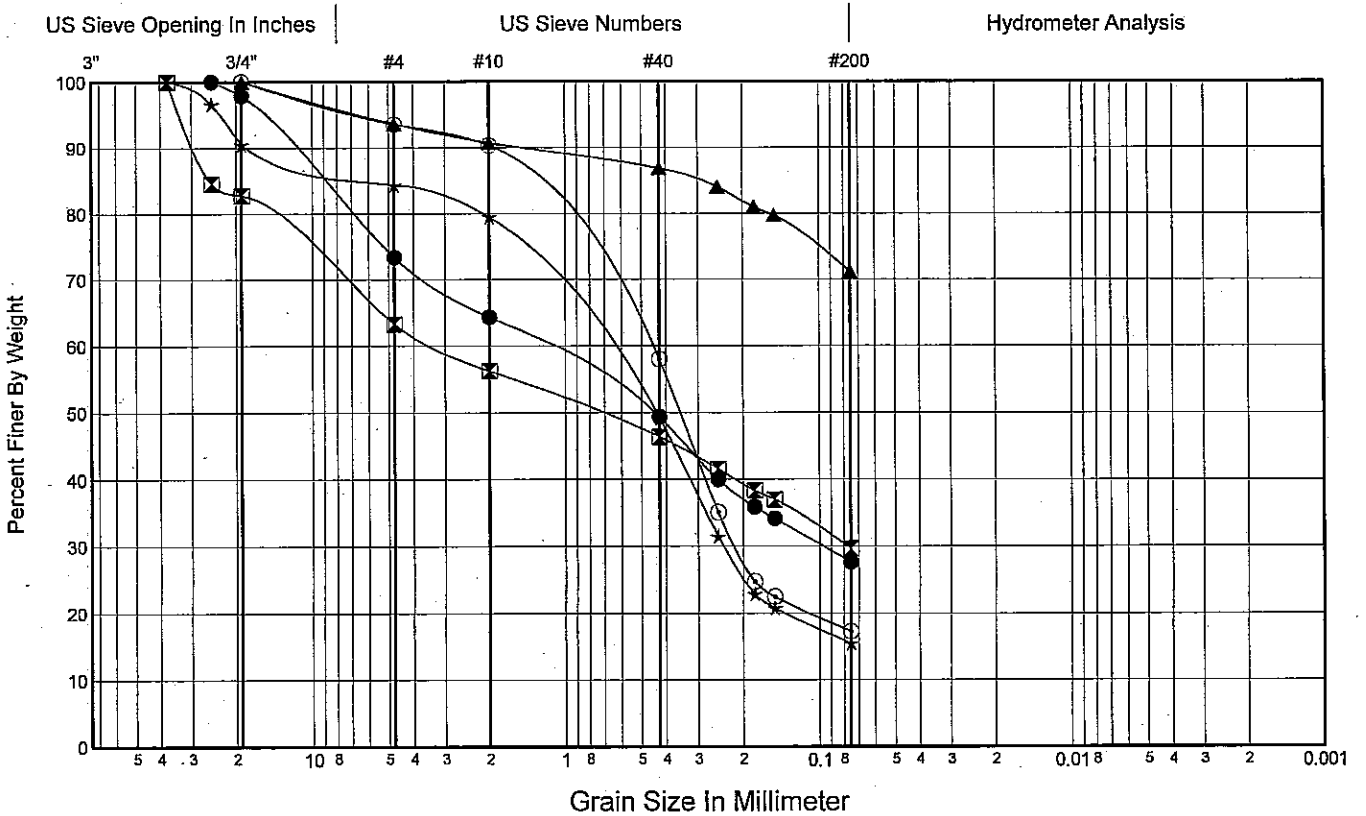
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.5	1.07	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	12			
⊠	6.5	1.98	D-2	GM	See Boring Log	SILTY GRAVEL with SAND	10			
▲	8.5	2.59	D-3	ML	See Boring Log	SILT with SAND	24	NA	NP	NA
★	11.5	3.51	D-4	SM	See Boring Log	SILTY SAND with GRAVEL	10			
⊙	13.5	4.11	D-5	SM	See Boring Log	SILTY SAND	16			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	26.7	45.8	27.6		
⊠	36.7	33.7	29.6		
▲	6.4	22.5	71.1		
★	15.7	68.8	15.5		
⊙	6.4	76.3	17.3		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.284	0.46	0.10		
⊠	3.177	0.75	0.08		
▲					
★	0.739	0.44	0.24	0.14	
⊙	0.467	0.35	0.21	0.11	



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Hole No. **H-1-05** Sheet **2** of **2**

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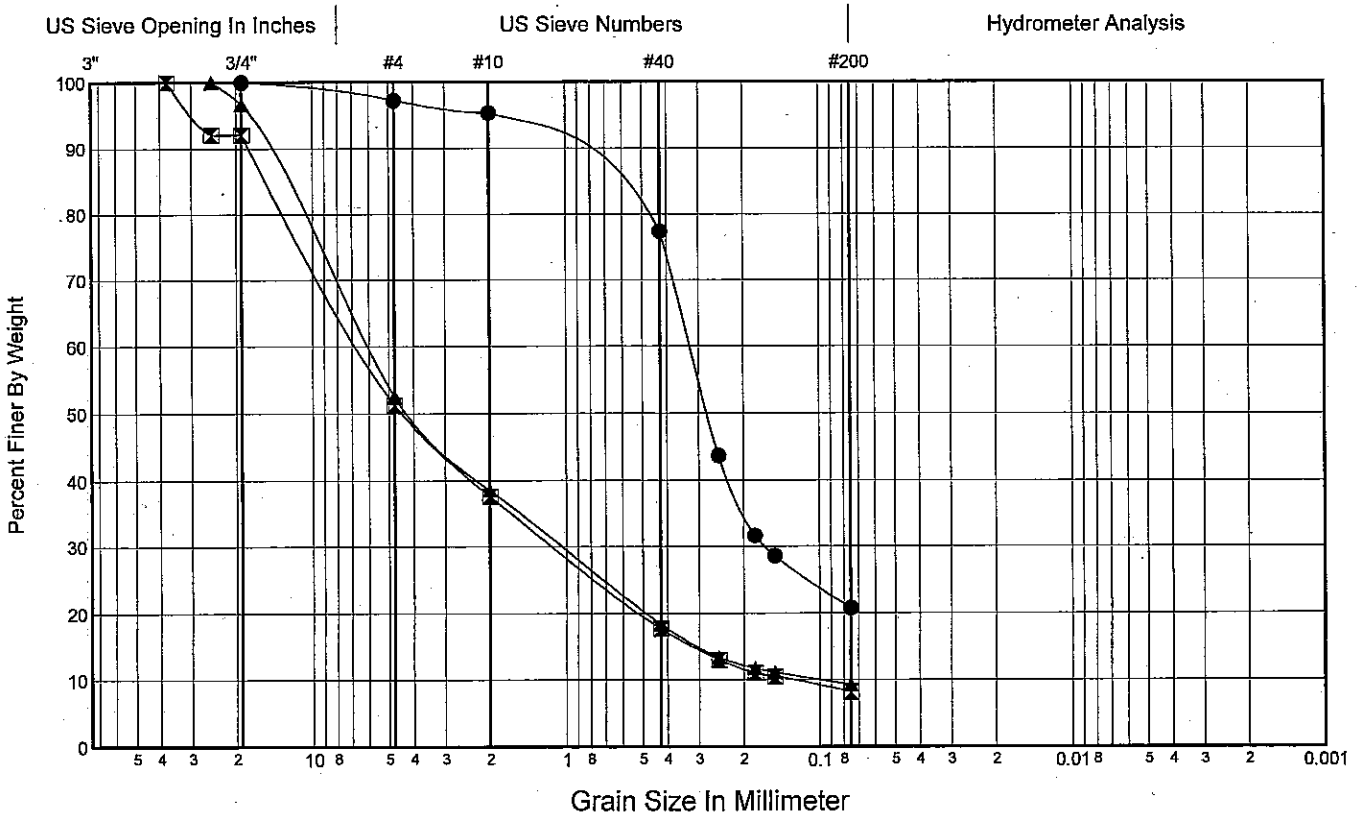
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	18.5	5.64	D-6	SM	See Boring Log	SILTY SAND	19			
⊠	23.5	7.16	D-7	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND	8			
▲	38.5	11.73	D-10	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND	7			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	2.8	76.5	20.7		
⊠	48.8	43.1	8.2	1.5	49.7
▲	47.6	43.2	9.2	1.8	60.5

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.323	0.28	0.16		
⊠	6.398	4.39	1.10	0.51	0.129
▲	6.021	4.08	1.04	0.48	0.100



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Hole No. **H-2-05** Sheet **1** of **2**

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Washington State Department of Transportation

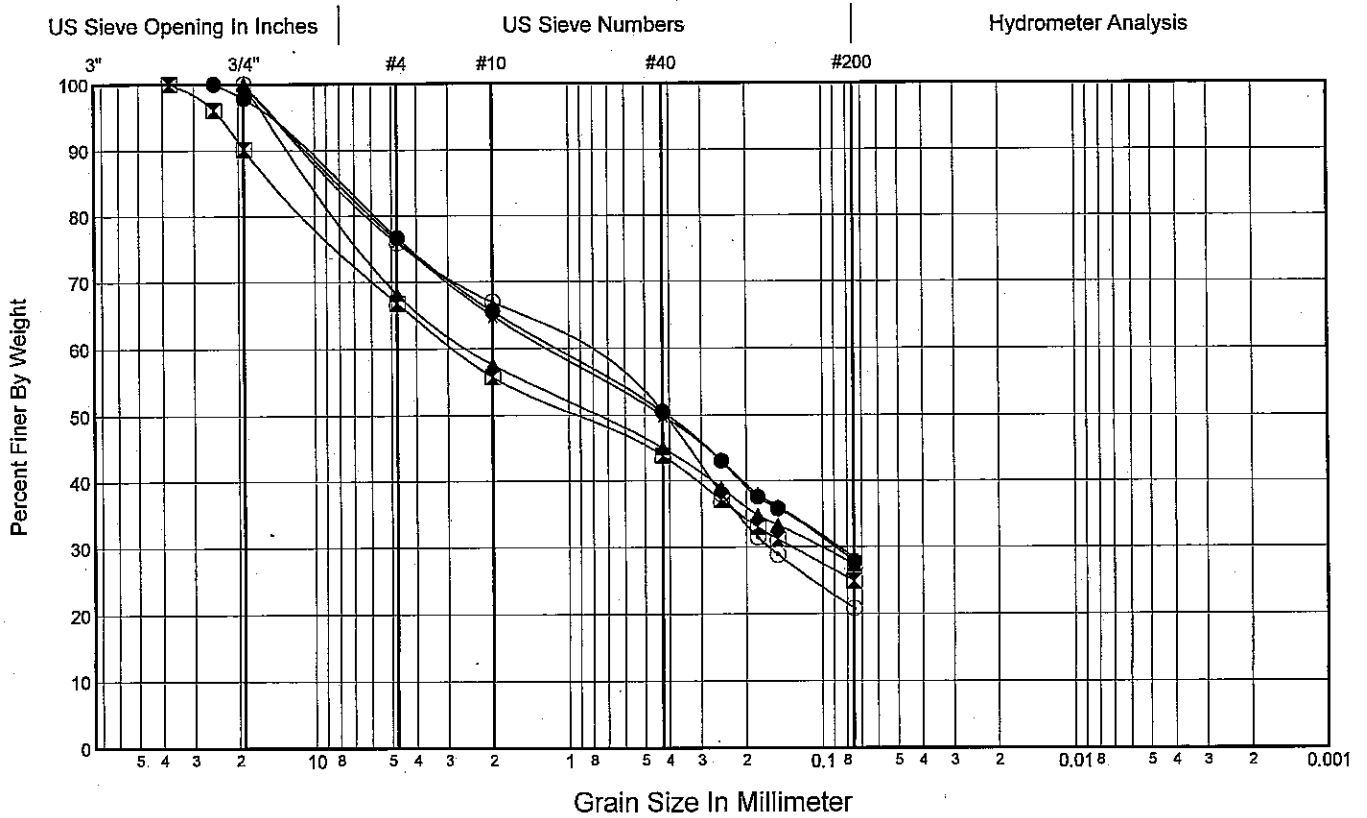
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.5	1.07	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	11			
⊠	8.5	2.59	D-3	SM	See Boring Log	SILTY SAND with GRAVEL	9			
▲	11.5	3.51	D-4	SM	See Boring Log	SILTY SAND with GRAVEL	10			
★	13.5	4.11	D-5	SM	See Boring Log	SILTY SAND with GRAVEL	10			
⊙	18.5	5.64	D-6	SM	See Boring Log	SILTY SAND with GRAVEL	12			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	23.3	48.9	27.8		
⊠	33.2	41.9	24.9		
▲	31.9	40.8	27.3		
★	23.8	47.9	28.4		
⊙	24.2	55.0	20.8		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.130	0.41	0.09		
⊠	2.799	0.95	0.13		
▲	2.445	0.79	0.10		
★	1.205	0.43	0.09		
⊙	1.041	0.42	0.16		



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Hole No. **H-2-05** Sheet **2** of **2**

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Washington State Department of Transportation

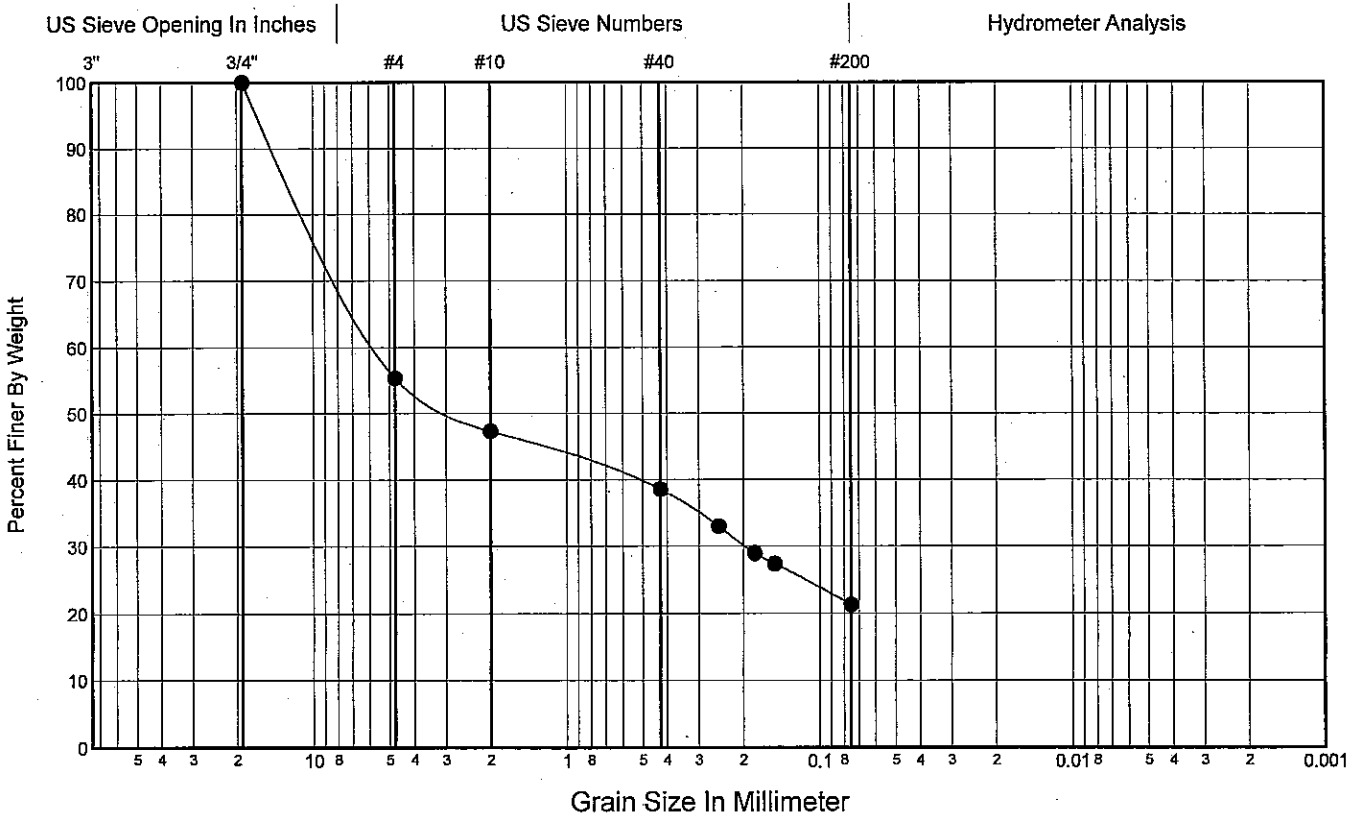
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	23.5	7.16	D-7	GM	See Boring Log	SILTY GRAVEL with SAND	9			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	44.7	34.0	21.3		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	5.494	2.69	0.20		



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Hole No. **H-3-05** Sheet **1** of **2**

Project **Olympic Region Headquarters Replacement, Geotechnical Baseline Report**

Laboratory Summary

Washington State Department of Transportation

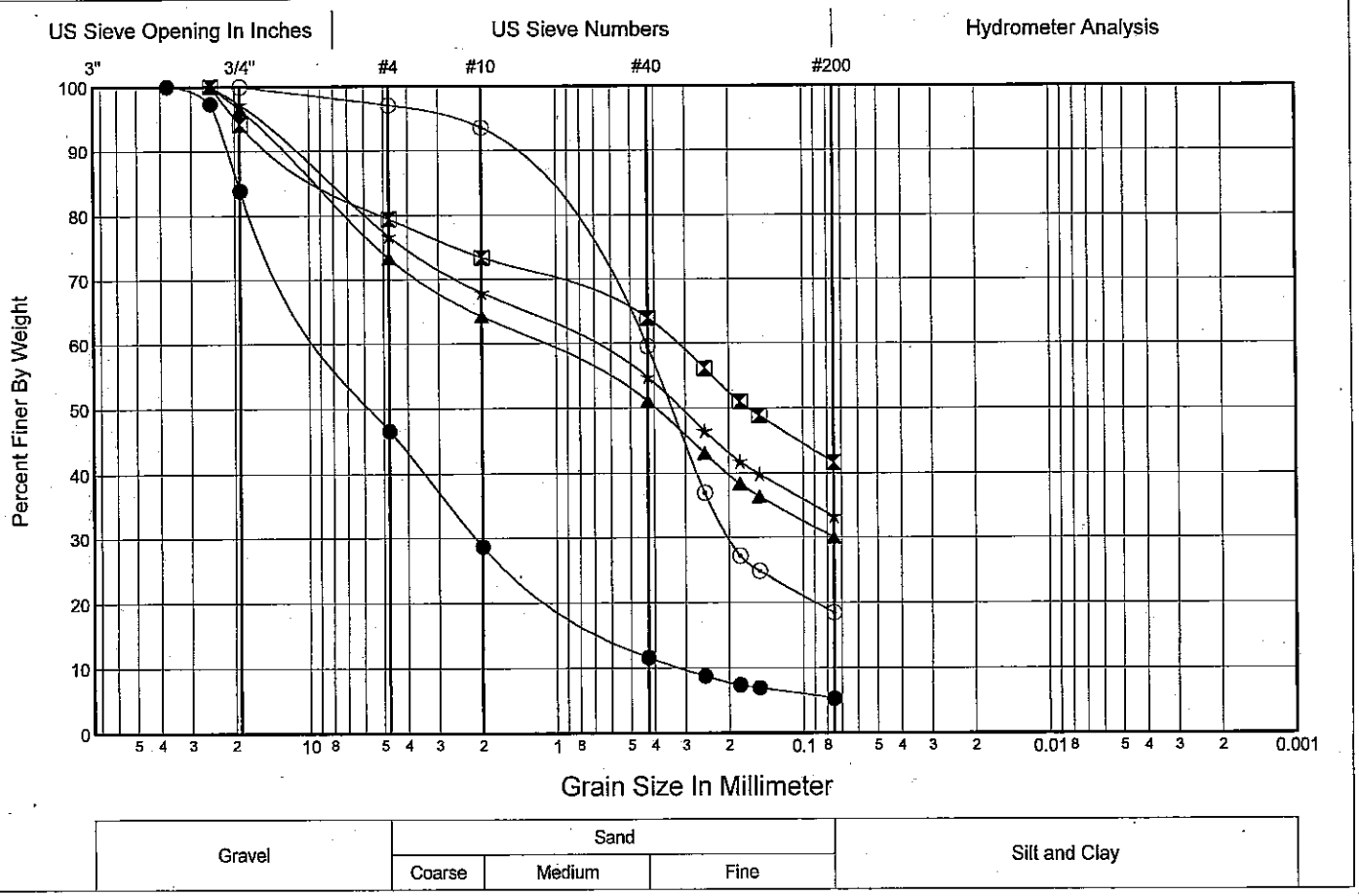
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.5	1.07	D-1	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND	8			
⊠	6.5	1.98	D-2	SM	See Boring Log	SILTY SAND with GRAVEL	10			
▲	8.5	2.59	D-3	SM	See Boring Log	SILTY SAND with GRAVEL	9			
★	11.5	3.51	D-4	SM	See Boring Log	SILTY SAND with GRAVEL	12			
⊙	23.5	7.16	D-7	SM	See Boring Log	SILTY SAND	16			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	53.5	41.3	5.2	1.8	24.8
⊠	20.6	37.8	41.6		
▲	26.7	43.3	30.0		
★	23.3	43.5	33.2		
⊙	2.9	78.6	18.4		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	7.842	5.41	2.13	0.91	0.317
⊠	0.326	0.17			
▲	1.220	0.40	0.08		
★	0.789	0.31			
⊙	0.435	0.34	0.20	0.09	



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Washington State Department of Transportation

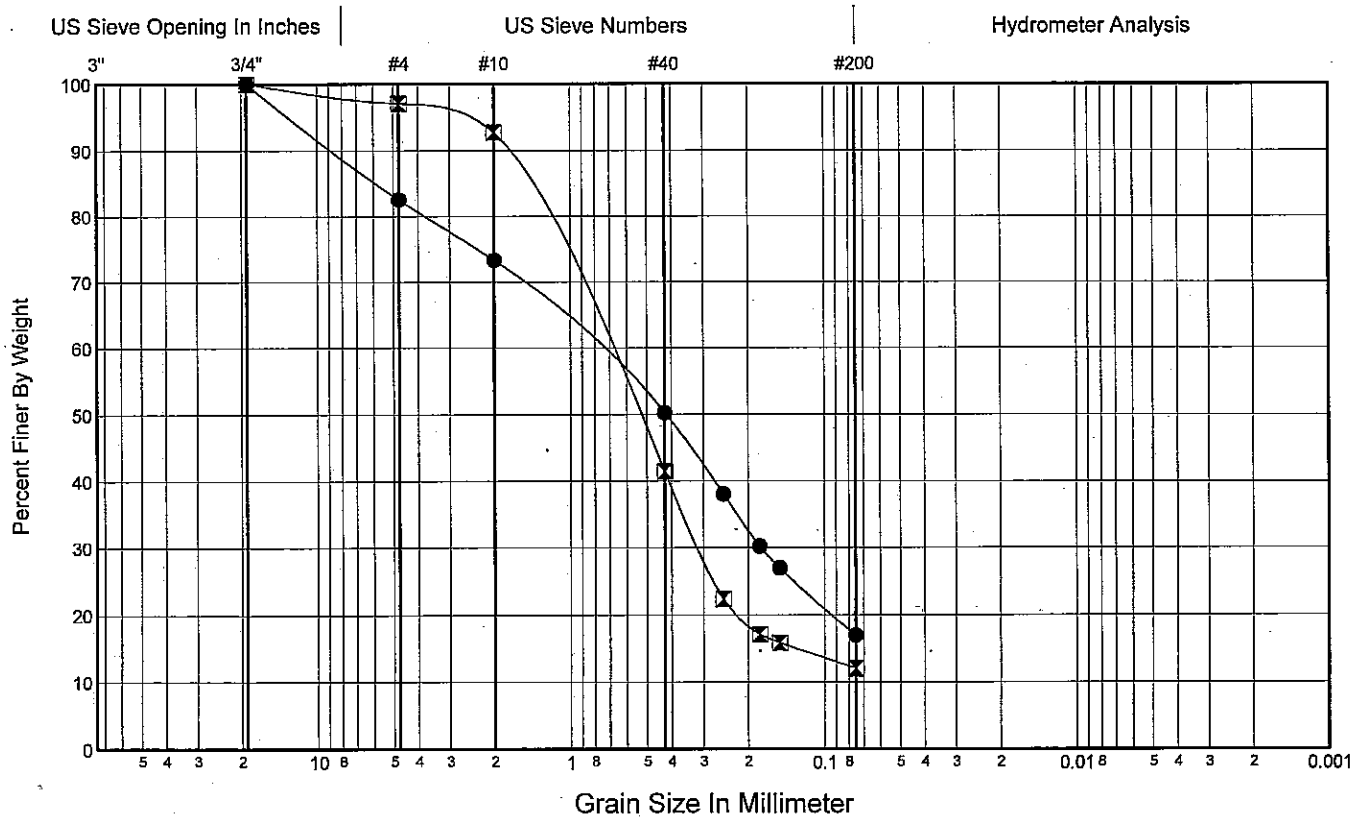
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	33.5	10.21	D-9	SM	See Boring Log	SILTY SAND with GRAVEL	14			
⊠	43.5	13.26	D-11	SM	See Boring Log	SILTY SAND	13			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	17.5	65.6	16.9		
⊠	2.9	85.1	12.0	2.5	14.3

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.819	0.42	0.18	0.09	
⊠	0.745	0.55	0.31	0.22	



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Washington State Department of Transportation

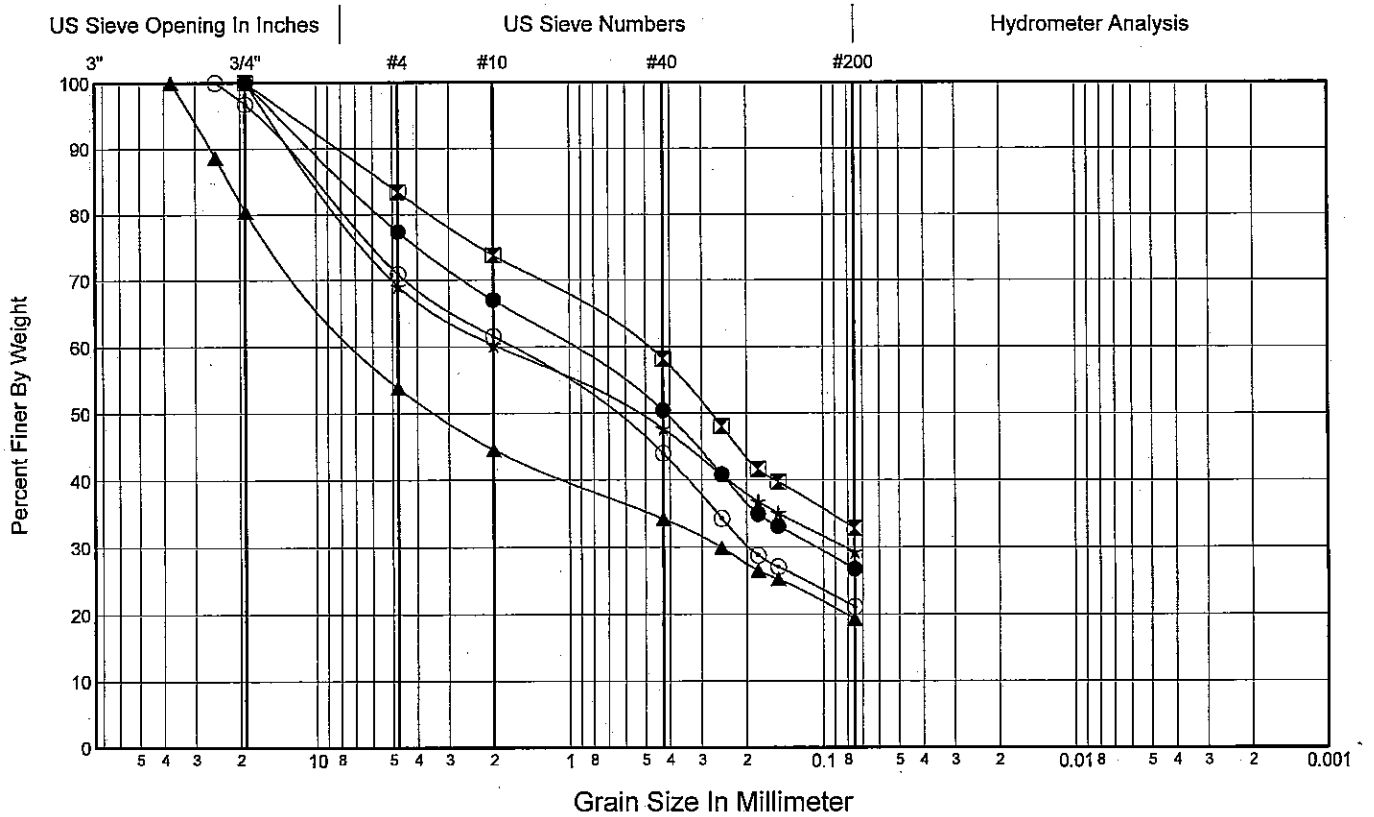
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.0	0.91	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	17			
⊠	4.0	1.22	D-2	SM	See Boring Log	SILTY SAND with GRAVEL	12			
▲	9.0	2.74	D-4	GM	See Boring Log	SILTY GRAVEL with SAND	8			
★	12.0	3.66	D-5	SM	See Boring Log	SILTY SAND with GRAVEL	11			
⊙	14.0	4.27	D-6	SM	See Boring Log	SILTY SAND with GRAVEL	11			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	22.7	50.6	26.7		
⊠	16.6	50.6	32.8		
▲	46.2	34.5	19.3		
★	30.9	39.8	29.2		
⊙	29.1	49.8	21.1		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.042	0.42	0.11		
⊠	0.511	0.28			
▲	6.570	3.34	0.25	0.08	
★	1.943	0.57	0.08		
⊙	1.744	0.72	0.19		



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Laboratory Summary

Washington State Department of Transportation

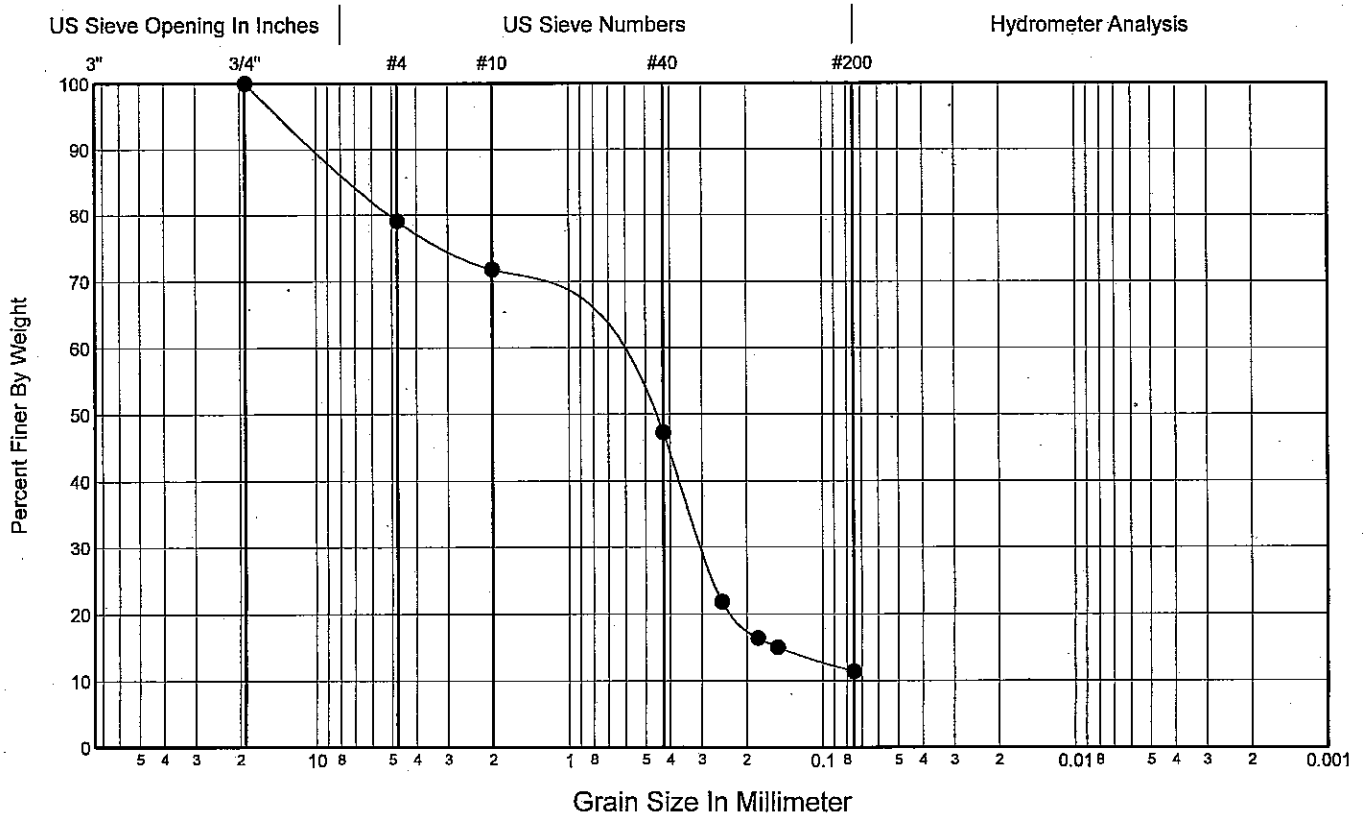
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	29.0	8.84	D-9	SW-SM	See Boring Log	WELL-GRADED SAND with SILT and GRAVEL	13			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	21.0	67.7	11.4	1.6	16.5

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.951	0.51	0.30	0.22	



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Washington State Department of Transportation

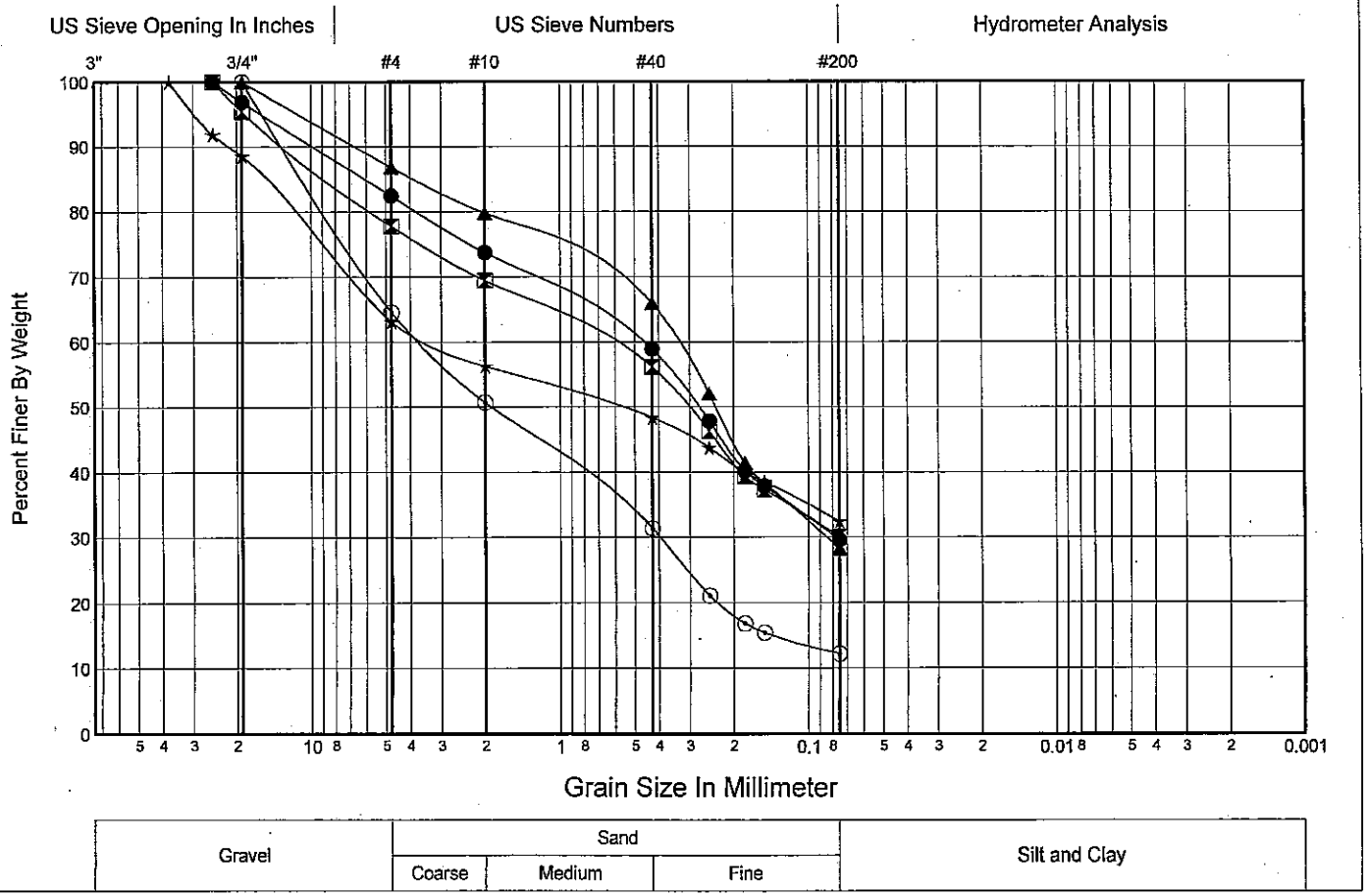
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.5	1.07	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	12			
⊠	6.5	1.98	D-2	SM	See Boring Log	SILTY SAND with GRAVEL	12			
▲	13.5	4.11	D-5	SM	See Boring Log	SILTY SAND	11			
★	23.5	7.16	D-7	GM	See Boring Log	SILTY GRAVEL with SAND	10	NA	NP	NA
⊙	28.5	8.69	D-8	SM	See Boring Log	SILTY SAND with GRAVEL	9			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	17.6	52.9	29.5		
⊠	22.3	47.7	30.0		
▲	13.2	58.6	28.2		
★	36.9	30.7	32.4		
⊙	35.5	52.4	12.2	0.9	75.4

GRADATION VALUES

	D60	D50	D30	D20	D10
●	0.477	0.28	0.08		
⊠	0.667	0.31			
▲	0.339	0.24	0.08		
★	3.202	0.59			
⊙	3.579	1.90	0.40	0.23	



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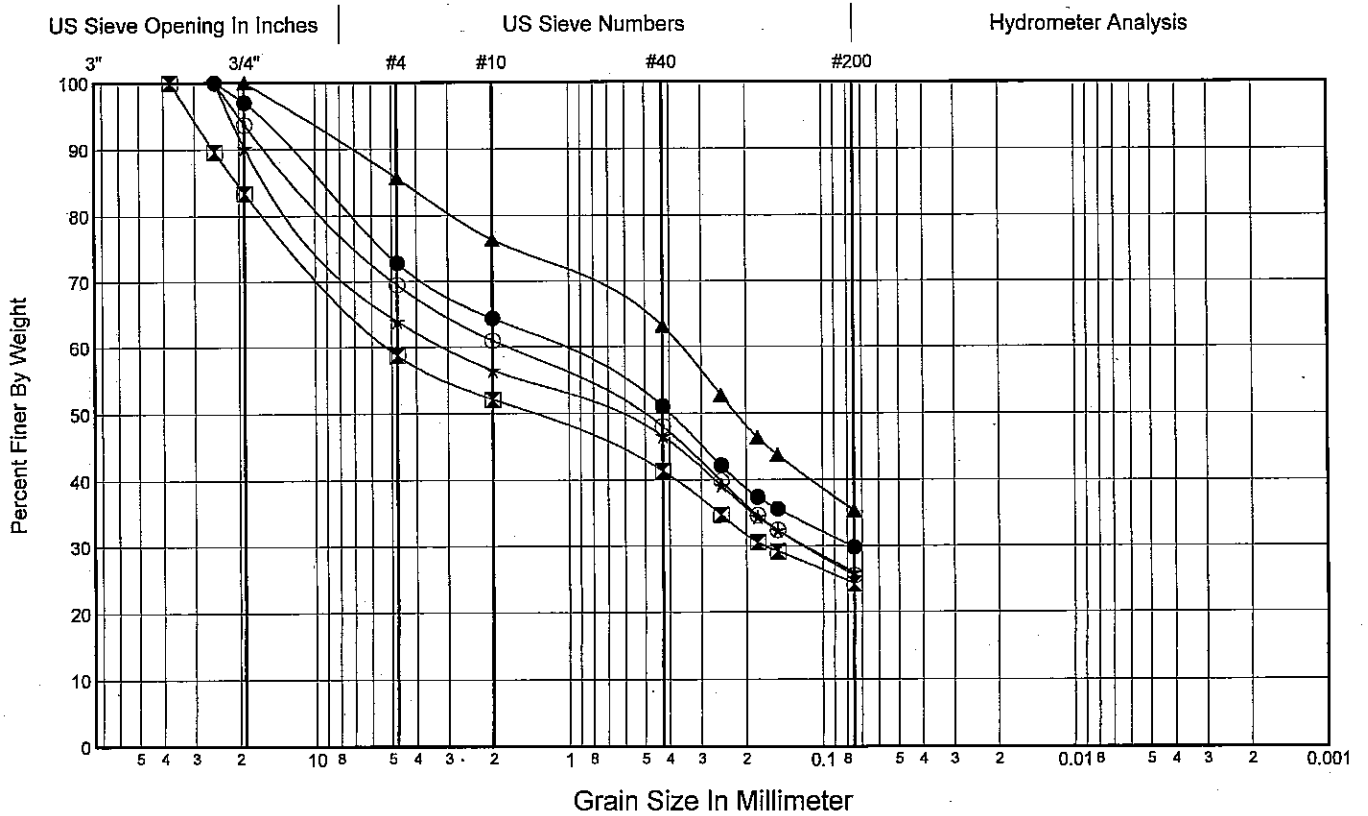
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.5	1.07	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	10			
⊠	6.5	1.98	D-2	GM	See Boring Log	SILTY GRAVEL with SAND	8			
▲	8.5	2.59	D-3	SM	See Boring Log	SILTY SAND	9			
★	11.5	3.51	D-4	SM	See Boring Log	SILTY SAND with GRAVEL	9			
⊙	13.0	3.96	D-5	SM	See Boring Log	SILTY SAND with GRAVEL	9			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	27.2	43.0	29.7		
⊠	41.3	34.4	24.3		
▲	14.4	50.3	35.3		
★	36.1	37.9	26.0		
⊙	30.6	43.9	25.5		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.214	0.40	0.08		
⊠	5.111	1.48	0.17		
▲	0.363	0.22			
★	3.021	0.73	0.12		
⊙	1.793	0.54	0.12		



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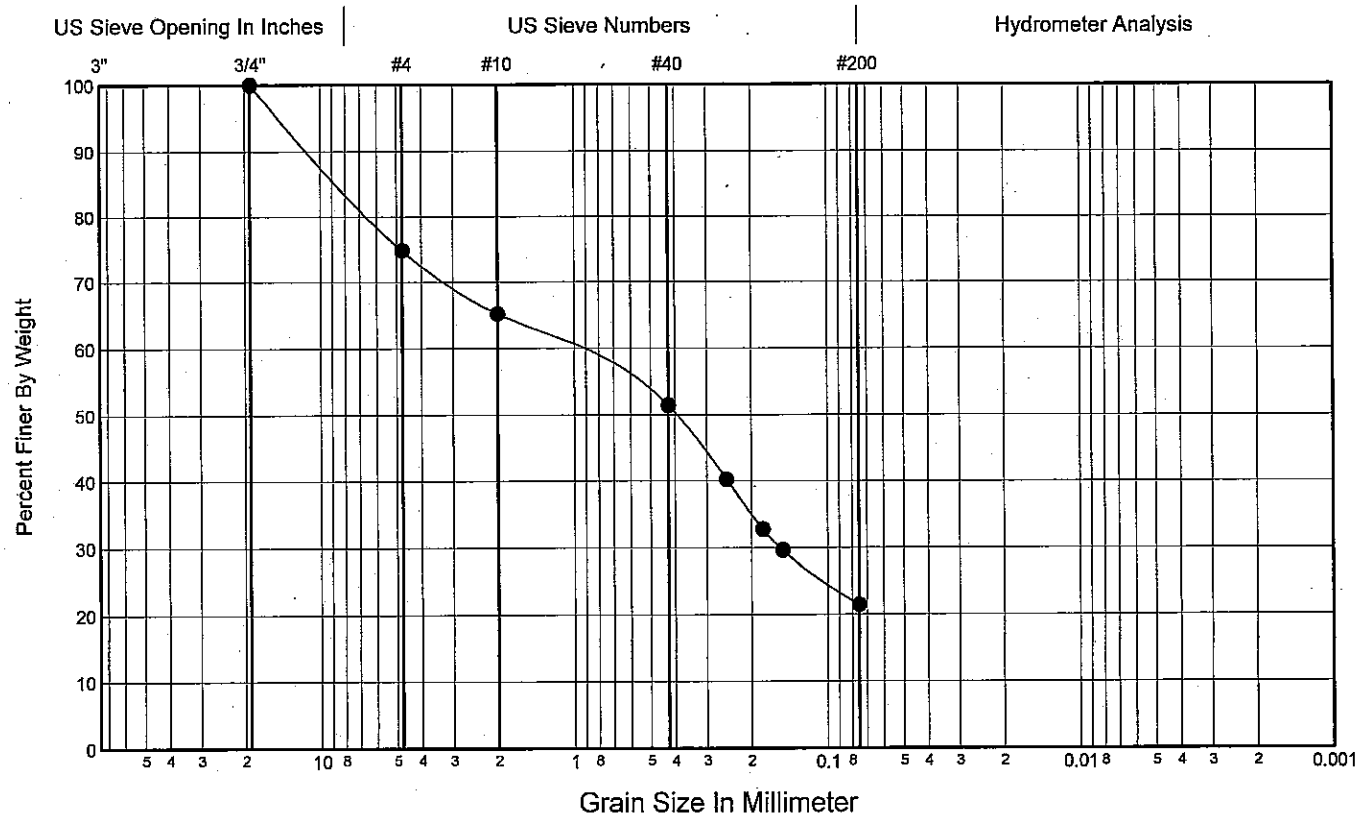
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	28.5	8.69	D-8	SM	See Boring Log	SILTY SAND with GRAVEL	10			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	25.2	53.3	21.4		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.120	0.40	0.15		



Gravel	Sand			Silt and Clay
	Coarse	Medium	Fine	

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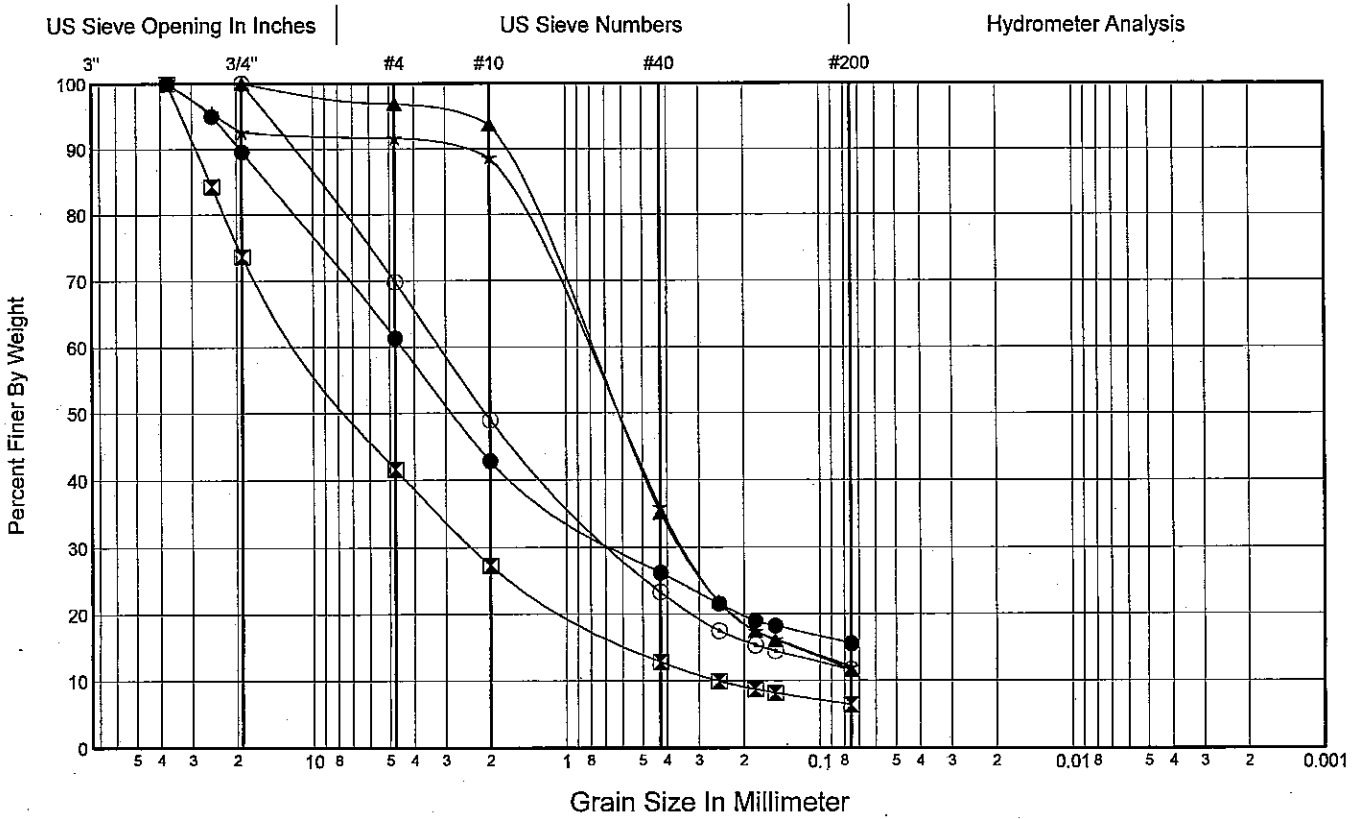
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.0	1.22	D-1	SM	See Boring Log	SILTY SAND with GRAVEL	10			
⊠	9.0	2.74	D-3	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND	10			
▲	12.0	3.66	D-4	SW-SM	See Boring Log	WELL-GRADED SAND with SILT	13			
★	14.0	4.27	D-5	SM	See Boring Log	SILTY SAND	10			
⊙	19.0	5.79	D-6	SW-SM	See Boring Log	WELL-GRADED SAND with SILT and GRAVEL	11			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	38.7	45.8	15.5		
⊠	58.4	35.2	6.4	2.1	41.4
▲	3.1	85.3	11.6	2.5	13.9
★	8.3	79.6	12.0	2.5	16.2
⊙	30.2	58.2	11.6	2.6	63.1

GRADATION VALUES

	D60	D50	D30	D20	D10
●	4.469	2.80	0.61	0.21	
⊠	10.537	6.84	2.36	0.92	0.254
▲	0.819	0.63	0.35	0.22	
★	0.862	0.64	0.34	0.22	
⊙	3.166	2.09	0.64	0.32	



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Laboratory Summary

Washington State Department of Transportation

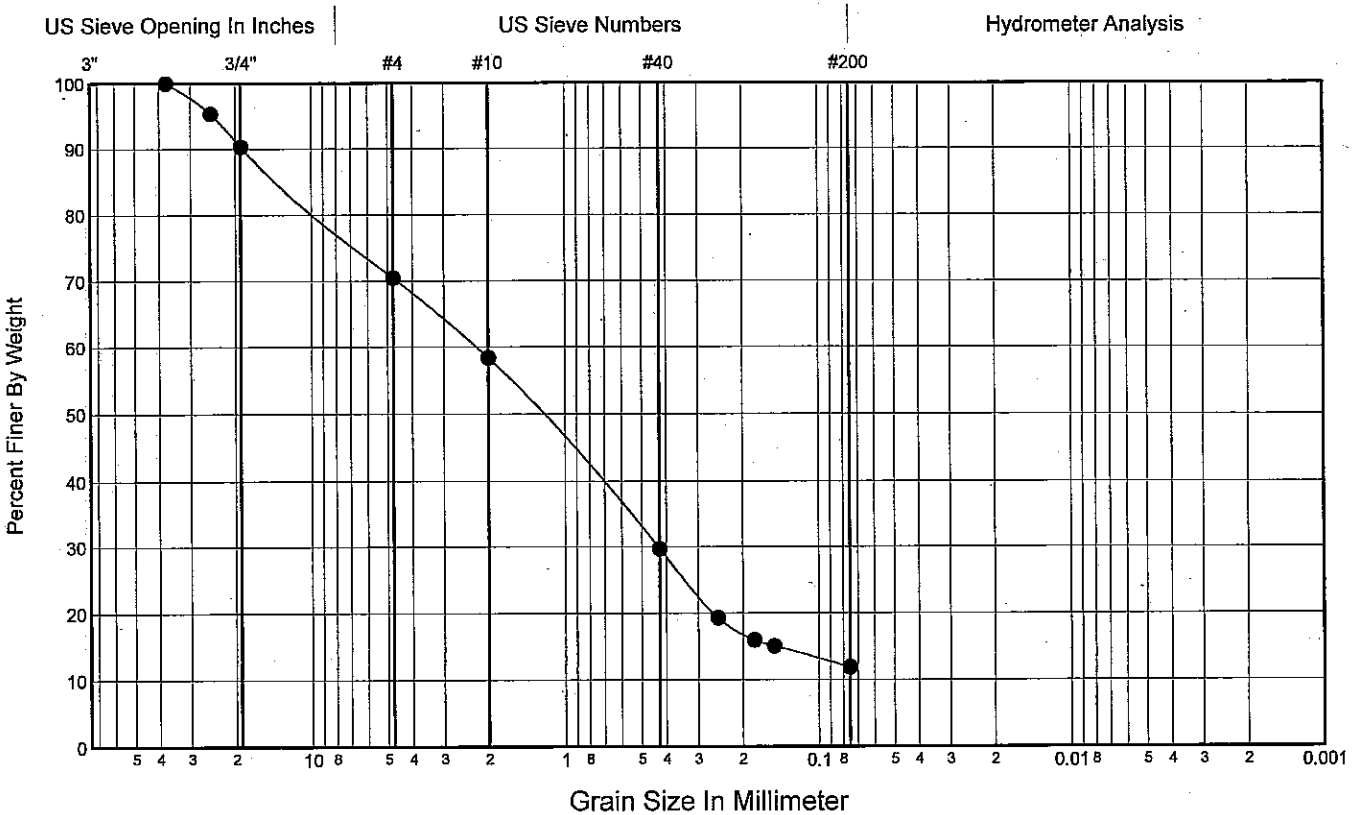
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	29.0	8.84	D-8	SW-SM	See Boring Log	WELL-GRADED SAND with SILT and GRAVEL	13			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	29.6	58.6	11.9	1.7	45.3

GRADATION VALUES

	D60	D50	D30	D20	D10
●	2.254	1.27	0.43	0.26	



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Hole No. **TP-1-05** Sheet **1** of **1**

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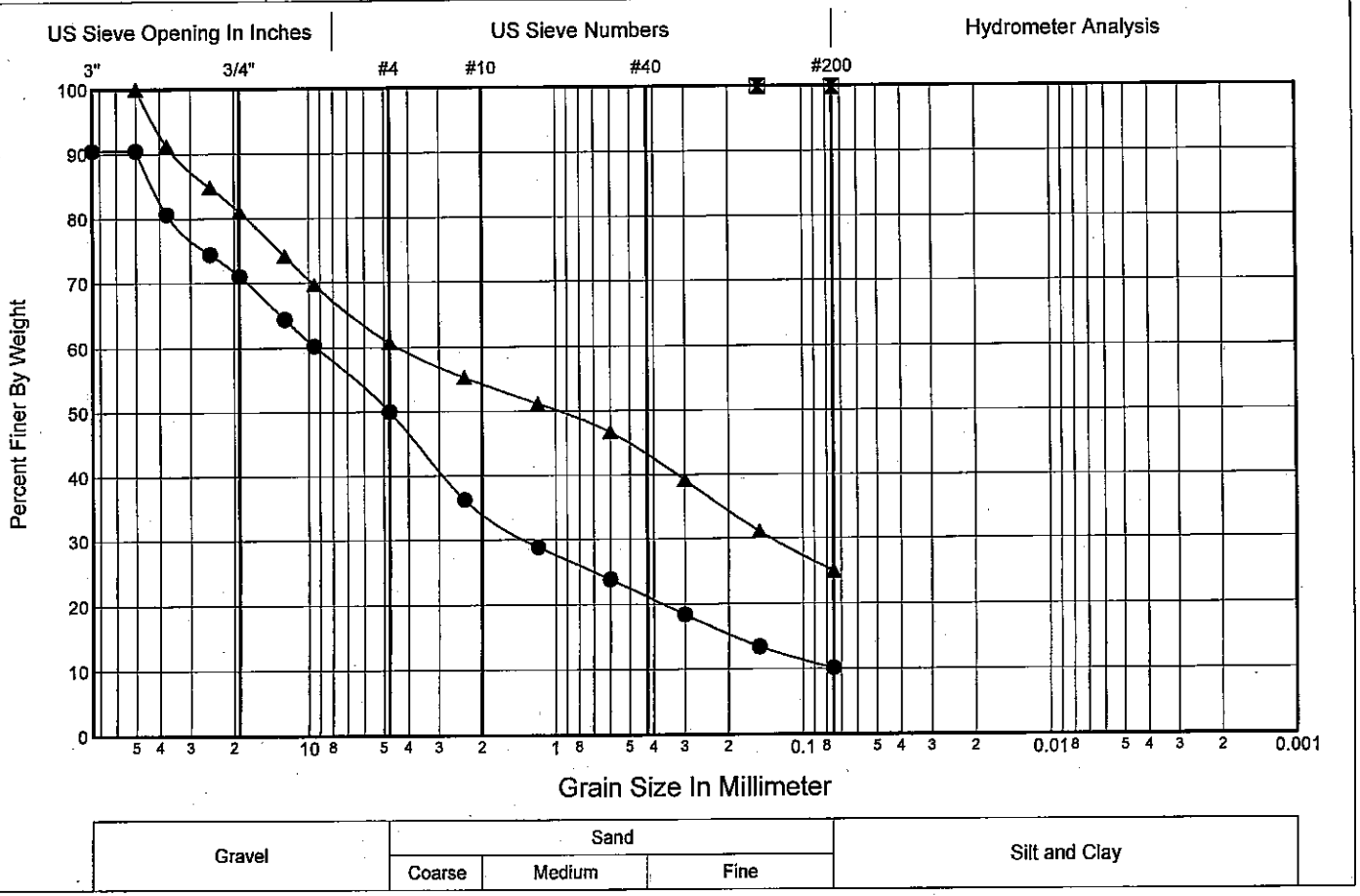
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	4.3	1.31	B-1	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND				
⊠	4.3	1.31	B-1-A		See Boring Log	Moisture Content Only	5			
▲	10.0	3.05	B-2	GM	See Boring Log	SILTY GRAVEL with SAND				
★	10.0	3.05	B-2-A		See Boring Log	Moisture Content Only	7			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	40.5	39.9	10.1	2.5	127.7
⊠	0.0	0.1	99.9		
▲	39.3	35.8	24.9		
★	0.0	0.1	99.9		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	9.358	4.75	1.32	0.37	
⊠					
▲	4.349	1.00	0.13		
★					



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Hole No. **TP-2-05** Sheet **1** of **1**

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Laboratory Summary

Washington State Department of Transportation

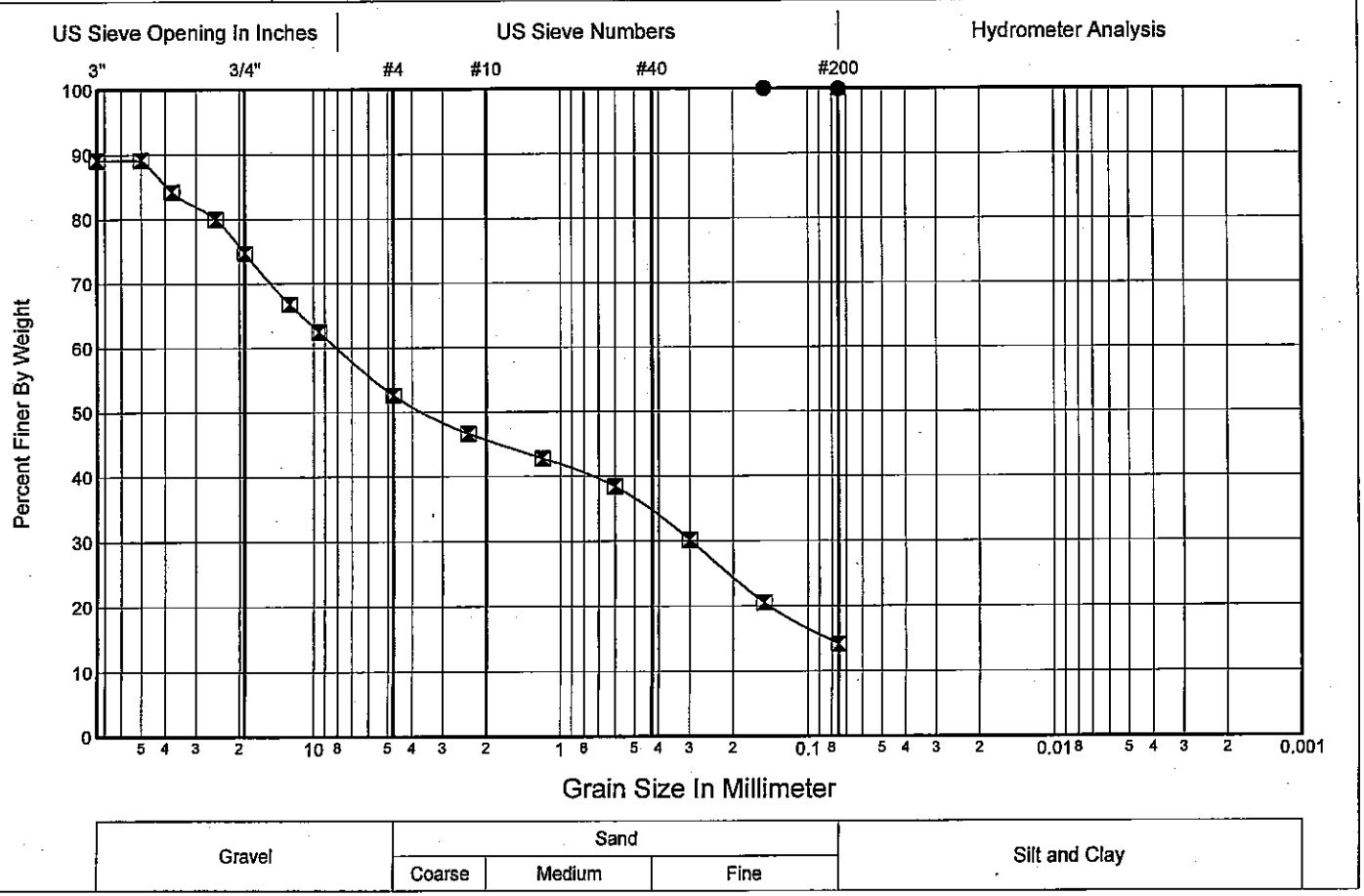
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	3.0	0.91	B-1		See Boring Log	Moisture Content Only	2			
⊠	6.8	2.07	B-2	SM	See Boring Log	SILTY SAND with GRAVEL				
▲	6.8	2.08	B-2-A		See Boring Log	Moisture Content Only	7			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	0.0	0.1	99.9		
⊠	36.5	38.5	14.1		
▲	0.0	0.0	100.0		

GRADATION VALUES

	D60	D50	D30	D20	D10
●					
⊠	7.994	3.50	0.30	0.14	
▲					



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Laboratory Summary

Washington State Department of Transportation

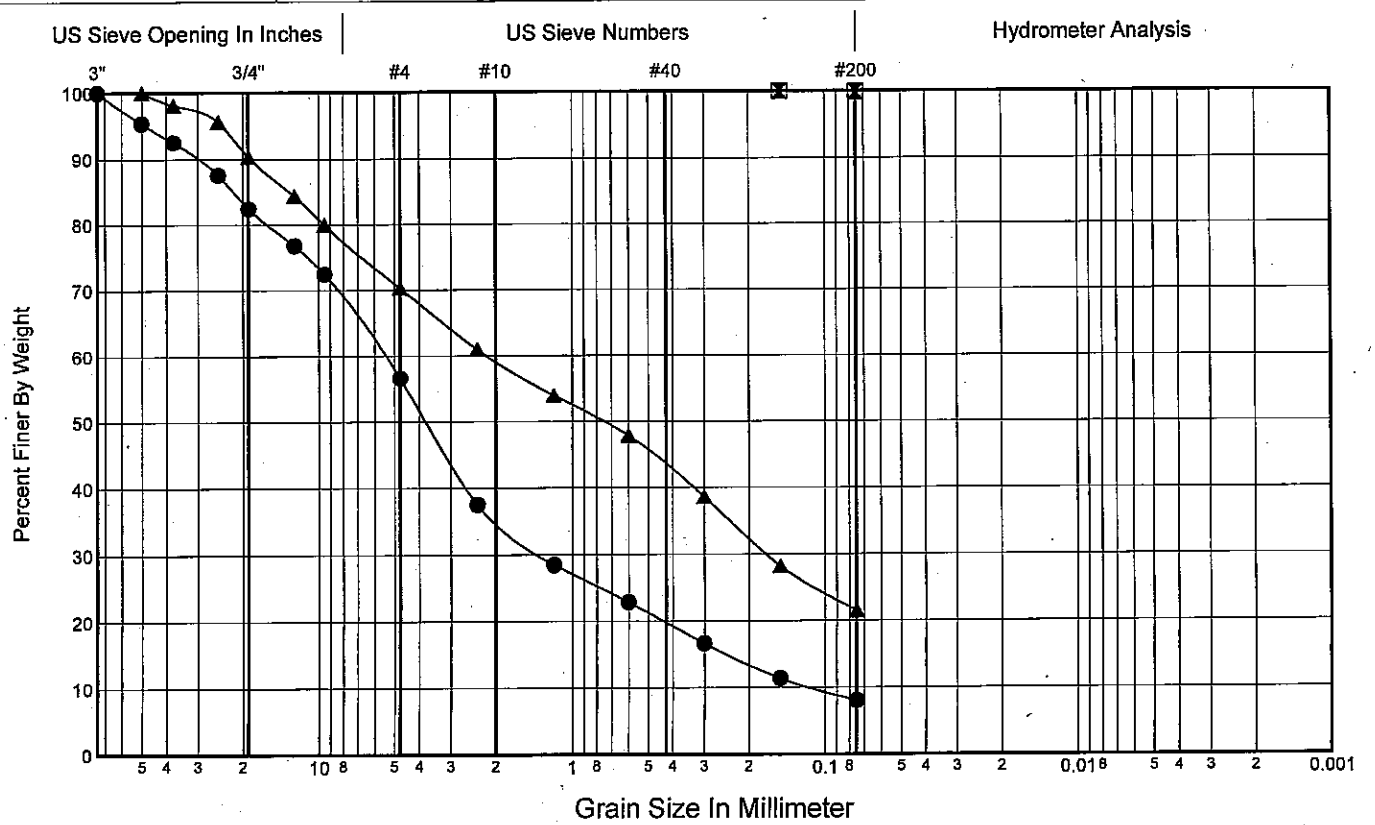
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	2.8	0.84	B-1	SW-SM	See Boring Log	WELL-GRADED SAND with SILT and GRAVEL				
⊠	2.8	0.84	B-1-A		See Boring Log	Moisture Content Only	3			
▲	9.0	2.74	B-2	SM	See Boring Log	SILTY SAND with GRAVEL				
★	9.0	2.75	B-2-A		See Boring Log	Moisture Content Only	6			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	43.4	48.6	8.0	2.8	48.5
⊠	0.0	0.1	99.9		
▲	29.7	48.8	21.5		
★	0.0	0.1	99.9		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	5.513	3.73	1.33	0.44	0.114
⊠					
▲	2.155	0.77	0.17		
★					



Job No. **BE-0034** Date **January 9, 2006**

Hole No. **TP-4-05** Sheet **1** of **1**

Project **Olympic Region Headquarters Replacement, Geotechnical Baseline Report**

Laboratory Summary

Washington State Department of Transportation

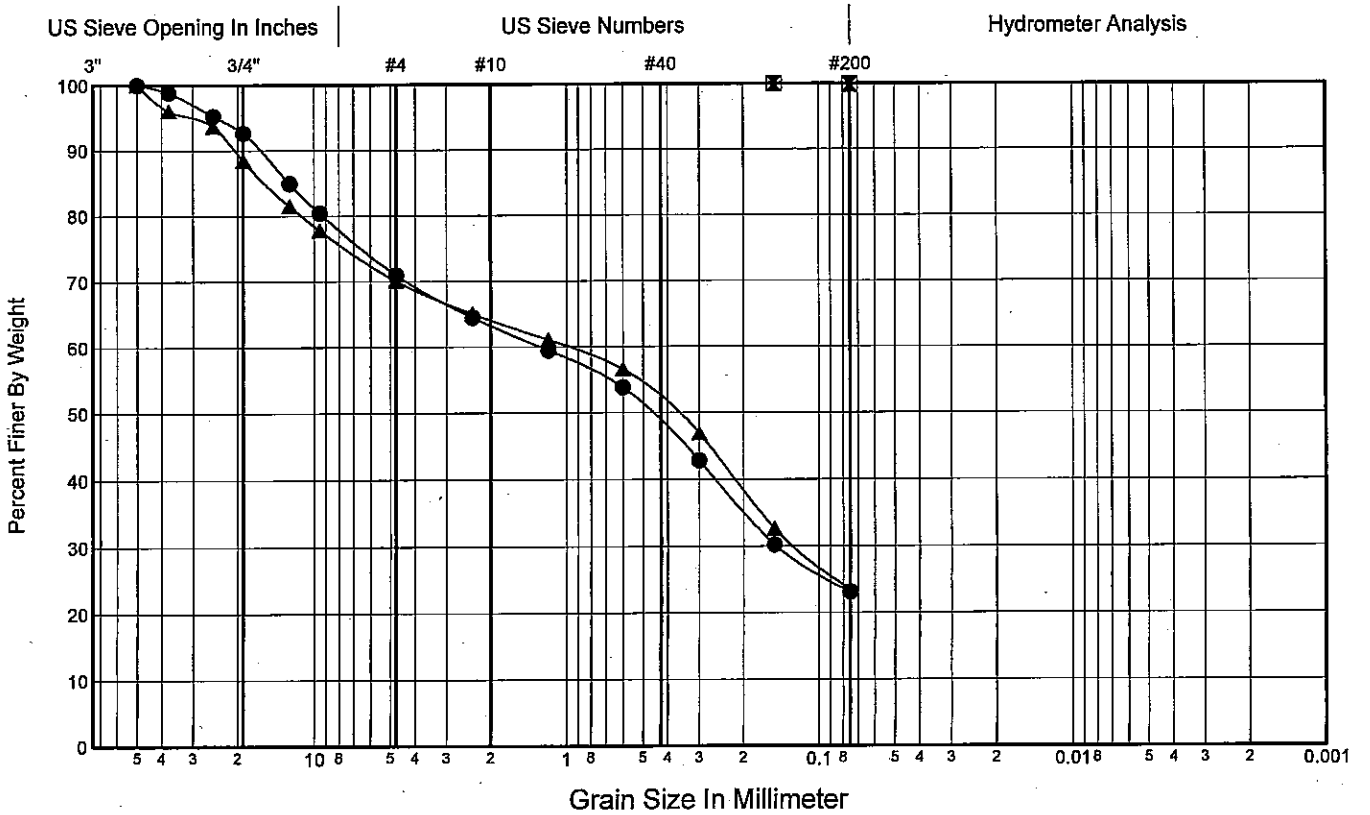
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	6.4	1.95	B-1	SM	See Boring Log	SILTY SAND with GRAVEL				
⊠	6.4	1.95	B-1-A		See Boring Log	Moisture Content Only	8			
▲	10.6	3.23	B-2	SM	See Boring Log	SILTY SAND with GRAVEL				
★	10.6	3.23	B-2-A		See Boring Log	Moisture Content Only	10			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	29.1	47.8	23.1		
⊠	0.0	0.1	99.9		
▲	30.0	46.5	23.5		
★	0.0	0.1	99.9		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	1.274	0.47	0.15		
⊠					
▲	1.007	0.38	0.12		
★					



Job No. **BE-0034** Date **January 9, 2006**

Hole No. **TP-5-05** Sheet **1** of **1**

Project **Olympic Region Headquarters Replacement, Geotechnical Baseline Report**

Laboratory Summary

Washington State Department of Transportation

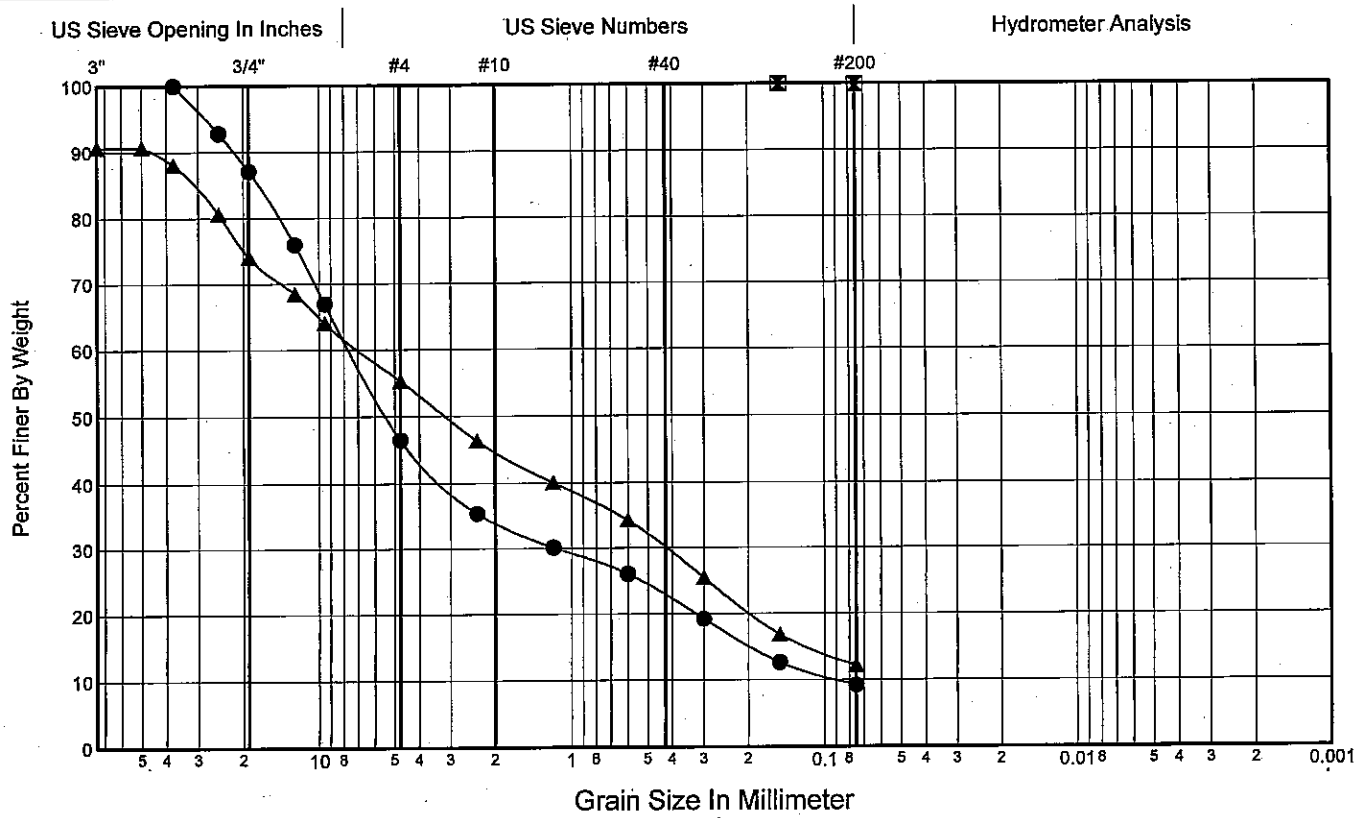
	Depth (ft)	Depth (m)	Sample No.	USCS	Color	Description	MC%	LL	PL	PI
●	2.0	0.61	B-1	GW-GM	See Boring Log	WELL-GRADED GRAVEL with SILT and SAND				
⊠	2.0	0.61	B-1-A		See Boring Log	Moisture Content Only	7			
▲	7.2	2.19	B-2	SM	See Boring Log	SILTY SAND with GRAVEL				
★	7.2	2.20	B-2-A		See Boring Log	Moisture Content Only	7			

GRADATION FRACTIONS

	%Gravel	%Sand	%Fines	Cc	Cu
●	53.5	37.3	9.2	2.0	84.8
⊠	0.0	0.1	99.9		
▲	35.4	43.2	12.1	0.5	125.6
★	0.0	0.1	99.9		

GRADATION VALUES

	D60	D50	D30	D20	D10
●	7.514	5.35	1.16	0.33	0.089
⊠					
▲	6.919	3.15	0.43	0.19	
★					



WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: **DJM** (DTM)
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331645**
Lab Number **E -331645**
Trans. No. **474960**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-1-05**

Accpt.Samp.No.: **B-1** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"		100		
3"	1216.6	90		
2-1/2"				
2-1/4"				
2"				
1-1/2"	2472.4	81		
1-1/4"				
1"	3268.5	74		
3/4"	3704.3	71		
5/8"				
1/2"	4558.7	64		
3/8"	5080.0	60		
1/4"				
No.4	6384.9	50		
TOTAL	12771.0			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	193.2	36		
No.10				
No.16	297.4	29		
No.20				
No.30	367.20	24		
No.40				
No.50	444.10	18		
No.60				
No.70				
No.80				
No.100	514.00	13		
No.140				
No.200	559.70	10.1		
Total	701.55			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A- T43L- T44T-
T43B-1.0 T43M- T44U-
T43J- T44A-1.0

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled:
Sampled By:
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331641**
Lab Number **E -331641**
Trans. No. **474961**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-1-05**

Accpt.Samp.No.: **B-2** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"				
2" (50)		100		
1-1/2"	981.0	91		
1-1/4"				
1"	1696.0	85		
3/4"	2127.8	81		
5/8"				
1/2"	2894.9	74		
3/8"	3393.7	70		
1/4"				
No.4	4393.2	61		
TOTAL	11175.3			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	86.6	56		
No.10				
No.16	151.8	51		
No.20				
No.30	223.10	47		
No.40				
No.50	342.20	39		
No.60				
No.70				
No.80				
No.100	470.90	31		
No.140				
No.200	568.40	25.0		
Total	963.69			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

Donald Brouillard By: DB
Date: 11/17/2005
Phone: (360)709-5446

T43A- T43L- T44T-
T43B-1.0 T43M- T44U-
T43J- T44A-1.0

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: DJM
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: OLYMPIC REGION HQ BUILDING
Contractor:
Subcontractor:

Work Order No. BE0034
Lab ID No. 0000331643
Lab Number E -331643
Trans. No. 474963
Bid Item No.
Org. No. 306310
F.A. No.

==========

Material: GRAVEL W/ SAND

Pit No.: TP-2-05

Accpt.Samp.No.: B-2 Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"		100		
3"	990.7	90		
2-1/2"				
2-1/4"				
2"				
1-1/2"	1435.1	86		
1-1/4"				
1"	1819.5	82		
3/4"	2297.1	77		
5/8"				
1/2"	3017.9	70		
3/8"	3411.6	66		
1/4"				
No.4	4306.1	57		
TOTAL	10076.6			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	71.4	52		
No.10				
No.16	117.8	48		
No.20				
No.30	170.20	44		
No.40				
No.50	268.60	37		
No.60				
No.70				
No.80				
No.100	384.30	28		
No.140				
No.200	461.00	22.4		
Total	759.81			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A- T43L- T44T-
T43B-1.0 T43M- T44U-
T43J- T44A-1.0

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: **DJM**
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331646**
Lab Number **E -331646**
Trans. No. **474964**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-3-05**

Accpt.Samp.No.: **B-1** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"		100		
2"	486.3	95		
1-1/2"	787.4	93		
1-1/4"				
1"	1321.8	88		
3/4"	1864.0	82		
5/8"				
1/2"	2459.7	77		
3/8"	2921.3	72		
1/4"				
No.4	4594.7	57		
TOTAL	10588.1			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	228.2	38		
No.10				
No.16	335.7	29		
No.20				
No.30	403.40	23		
No.40				
No.50	476.70	17		
No.60				
No.70				
No.80				
No.100	540.30	11		
No.140				
No.200	580.10	8.1		
Total	675.64			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A- T43L- T44T-
T43B-1.0 T43M- T44U-
T43J- T44A-1.0

Donald Brouillard By: 
Date: 11/17/2005
Phone: (360)709-5446

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: **DJM**
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331642**
Lab Number **E -331642**
Trans. No. **474965**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-3-05**

Accpt.Samp.No.: **B-2** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"		100		
2"	0.0	100		
1-1/2"	170.8	98		
1-1/4"				
1"	405.3	96		
3/4"	895.6	90		
5/8"				
1/2"	1448.2	84		
3/8"	1854.7	80		
1/4"				
No.4	2744.2	70		
TOTAL	9227.7			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	95.5	61		
No.10				
No.16	167.3	54		
No.20				
No.30	229.70	48		
No.40				
No.50	324.10	38		
No.60				
No.70				
No.80				
No.100	429.90	28		
No.140				
No.200	498.90	21.4		
Total	718.25			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A-1.0 T43L- T44T-
T43B- T43M- T44U-
T43J- T44A-1.0

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

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WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: **DJM**
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331644**
Lab Number **E -331644**
Trans. No. **474966**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-4-05**

Accpt.Samp.No.: **B-1** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"				
2"		100		
1-1/2"	106.6	99		
1-1/4"				
1"	434.0	95		
3/4"	674.1	93		
5/8"				
1/2"	1378.2	85		
3/8"	1789.8	80		
1/4"				
No.4	2647.4	71		
TOTAL	9110.8			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	87.1	65		
No.10				
No.16	154.7	59		
No.20				
No.30	231.00	54		
No.40				
No.50	379.10	43		
No.60				
No.70				
No.80				
No.100	547.70	30		
No.140				
No.200	643.10	23.2		
Total	954.38			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

T43A- T43L- T44T-
T43B-**1.0** T43M- T44U-
T43J- T44A-**1.0**

grading.dfr 3/0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled: 10/27/2005
Sampled By: **DJM**
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331640**
Lab Number **E -331640**
Trans. No. **474967**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-4-05**

Accpt.Samp.No.: **B-2** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"				
2"		100		
1-1/2"	362.6	96		
1-1/4"				
1"	581.1	94		
3/4"	1060.7	88		
5/8"				
1/2"	1691.4	81		
3/8"	2027.7	78		
1/4"				
No.4	2729.8	70		
TOTAL	9112.3			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	63.5	65		
No.10				
No.16	113.2	61		
No.20				
No.30	170.30	56		
No.40				
No.50	292.30	47		
No.60				
No.70				
No.80				
No.100	472.00	33		
No.140				
No.200	586.30	23.5		
Total	882.67			
	Dust Ratio			

==========

Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A- T43L- T44T-
T43B-**1.0** T43M- T44U-
T43J- T44A-**1.0**

Donald Brouillard By:
Date: 11/15/2005
Phone: (360)709-5446

grading.dfr 3/0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Work Order No. BE0034
Lab ID No. 0000331648
Lab Number E -331648
Trans. No. 474968
Bid Item No.
Org. No. 306310
F.A. No.

Date Sampled: 10/27/2005
Sampled By: DJM
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: OLYMPIC REGION HQ BUILDING
Contractor:
Subcontractor:

==========

Material: GRAVEL W/ SAND

Pit No.: TP-5-05

Accpt.Samp.No.: B-1 Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"				
3"				
2-1/2"				
2-1/4"				
2"				
1-1/2"				
1-1/4"		100		
1"	612.8	93		
3/4"	1101.6	87		
5/8"				
1/2"	2044.3	76		
3/8"	2813.1	67		
1/4"				
No.4	4552.9	46		
TOTAL	8504.1			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	161.3	35		
No.10				
No.16	237.2	30		
No.20				
No.30	295.40	26		
No.40				
No.50	394.90	19		
No.60				
No.70				
No.80				
No.100	490.00	13		
No.140				
No.200	540.10	9.1		
Total	672.88			
	Dust Ratio			

==========

Distribution:

Result: **INFORMATIONAL**
Remarks:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

T43A- T43L- T44T-
T43B-**1.0** T43M- T44U-
T43J- T44A-**1.0**

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

grading.dfr 3/0

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION - MATERIALS LABORATORY
PO BOX 47365 OLYMPIA, WA. 98504-7365/1655 SO. 2ND AVE TUMWATER, WA. 98512

Physical Testing Section
Grading Test Report
Test Method AASHTO T 27 & T 11

Date Sampled:
Sampled By:
Date Recvd HQ: 11/01/2005
S.R. No.:
Section: **OLYMPIC REGION HQ BUILDING**
Contractor:
Subcontractor:

Work Order No. **BE0034**
Lab ID No. **0000331647**
Lab Number **E -331647**
Trans. No. **474969**
Bid Item No.
Org. No. **306310**
F.A. No.

==========

Material: **GRAVEL W/ SAND**

Pit No.: **TP-5-05**

Accpt.Samp.No.: **B-2** Sample Loc.:

Test Loc.: By:

Coarse Grading

Size:	Accum. Weight	Percent Passing	Specs. Min.	Specs. Max.
4"		100		
3"	1273.8	91		
2-1/2"				
2-1/4"				
2"				
1-1/2"	1632.1	88		
1-1/4"				
1"	2640.6	81		
3/4"	3534.3	74		
5/8"				
1/2"	4289.6	68		
3/8"	4891.7	64		
1/4"				
No.4	6079.6	55		
TOTAL	13587.8			

Fine Grading

Size:	Accum. Weight	Percent Passing	Specs Min.	Specs Max.
1/4"				
No.4				
No.6				
No.8	103.2	46		
No.10				
No.16	175.6	40		
No.20				
No.30	242.70	34		
No.40				
No.50	343.70	25		
No.60				
No.70				
No.80				
No.100	443.00	17		
No.140				
No.200	497.20	12.0		
Total	636.51			
	Dust Ratio			

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Distribution:

General File X
Region Construction
Project Engineer:
TODD MOONEY X(2)

Result: **INFORMATIONAL**
Remarks:

THOMAS E. BAKER, P.E.
MATERIALS ENGINEER

Donald Brouillard By:
Date: 11/17/2005
Phone: (360)709-5446

T43A- T43L- T44T-
T43B-1.0 T43M- T44U-
T43J- T44A-1.0